THE ROYAL SOCIETY
FOR THE PROMOTION
OF HEALTH

Founded 1876

LIBRARY REGULATIONS

(a) Books, periodicals and pamphlets may be borrowed by Fellows, Ordinary Members, Associates and Affiliates personally or by a messenger producing a written order. The person to whom such publications are delivered shall sign a receipt for them in a book provided for that purpose.

(b) Publications may be borrowed through the post upon a written order. An acknowledgement of the receipt of such publications must be made on the form provided and returned to the Society immediately. Failing this, it will be assumed that the borrower has received the books, for which he will accordingly be held responsible. The postage of publications returned to the Society shall be defrayed by the borrower.

(c) A borrower may not have more than three publications in his possession at one time.

(d) A borrower will be considered liable for the value of any publication lost or damaged while on loan to him, and, if it be a single volume or part of a set, for the value of the whole work thereby rendered imperfect. Marking or writing in the publications is not permitted, and borrowers are requested to call attention to damage of this character.

(e) **Books and pamphlets may be retained for twenty-eight days. Periodicals may be retained for fourteen days. Applications for extension of the loan period must be made in writing before its expiry.** This loan period cannot be extended without application being made to the Secretary of the Society whose decision in this matter must be accepted as final and binding.

(f) Books and pamphlets added to the Library will not be lent until after the expiry of one month from the date received. The current number of a periodical may not be borrowed.

(g) Borrowers retaining publications longer than the time specified, and neglecting to return them when demanded, forfeit the right to borrow until they be returned, and for such further time as may be ordered by the Council.

Any borrower failing to comply with a request for the return of a publication shall be considered liable for the cost of replacing it, and the Council, may, after giving due notice to him, order it to be replaced at his expense.

No publication may be reissued to the same borrower until at least seven days have elapsed after its return, neither may it be transferred by one borrower to another.

(h) **Publications may not be taken or sent out of the United Kingdom.**

(i) Publications returned through the post must be securely packed and adequately protected.

(j) Parcels should be addressed: THE LIBRARIAN,

THE ROYAL SOCIETY OF HEALTH

90 BUCKINGHAM PALACE ROAD, LONDON, S.W.1

— June, 1960

Presented by Mr. H. K. Lewis
to the
Parkes Museum of Hygiene

JOURNAL

OF

PUBLIC HEALTH,

AND

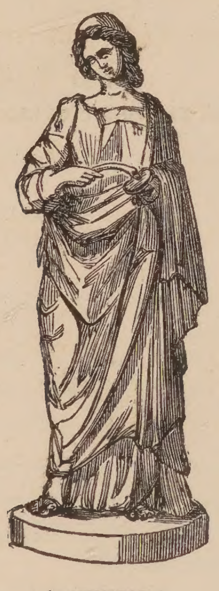
Sanitary Review.

EDITED BY

BENJAMIN W. RICHARDSON, M.D.,

LICENTIATE OF THE ROYAL COLLEGE OF PHYSICIANS,
PHYSICIAN TO THE ROYAL INFIRMARY FOR DISEASES OF THE CHEST, AND LECTURER ON
PUBLIC HYGIENE AT THE GROSVENOR PLACE MEDICAL SCHOOL.

NATIONAL HEALTH IS NATIONAL WEALTH.



ʽΥΓΙΕΙΑ

πρεσβίστη μακάρων.

VOL. II.

PRINTED AND PUBLISHED FOR THE PROPRIETOR BY

THOMAS RICHARDS, 37, GREAT QUEEN STREET.

1856.

LONDON
RICHARDS, 37, GREAT QUEEN STREET.

INDEX.

THE

JOURNAL OF PUBLIC HEALTH.

MARCH 1856.

MUNICIPAL GOVERNMENT; ITS TRUE SPHERE AND DUTIES.*

In modern London life, few events have caused a greater social sensation than the changes in municipal government, introduced by the new Act for the better local management of the metropolis. Our citizens are one and all on the *qui vive*, and are exchanging ideas on the probable results of the measure, with that generous flux of speech which is common to all small-talk conversations, where the speaker knows that the opinions he hears will not modify the course of events one jot, and that those which he gives, having the same weight, will not compromise him in the least degree, even should they turn out fallacious in the course of the ensuing day.

It is not our intention, on the present occasion, to enter into an inquiry regarding the probable results of the new metropolitan measure, or the strength of its political basis. Time will be the best and only faithful critic in these regards. We intend to take a more general view, and to indicate what the duties of municipal government in this country ought to embrace, irrespective for the moment of the regulations or restrictions of existing laws. We are emboldened in this task, by having before us a philosophical though brief treatise on "Municipal Government", from the pen of Mr. Roberton, of Manchester. Of this gentleman's valued labours we shall avail ourselves freely in succeeding paragraphs.

Vestry labours of the past.

As an introductory word, we cannot do better than refer at once to an observation made by the author above named, to the effect, that the whole duties of vestries, up to the present time, have seemed

* Suggestions for the Improvement of Municipal Government in Populous and Manufacturing Towns. By John Roberton, Surgeon. Manchester: 1855. The Metropolis Local Management Act. London: 1855.

to consist in the correction of nuisances, lighting, cleansing, paving, sewering, rounding off corners, widening streets, opening new thoroughfares, supplying water, and keeping up an effective police. These duties have of course implied others of a dependent kind, such as the infliction and collection of rates. But, necessary and important as they are, they embody scarce a fractional part of the wider social government now urgently demanded. If the new Act for the metropolis serves only to support with a little more efficiency the limited duties just narrated, it will fail signally, and had better not have been brought before the legislature at all.

The high and low rate.

The true usefulness of municipal government will depend ultimately, in a great measure, upon the breadth of view with which its representatives are able to grasp the various questions connected with social economy and monetary expenditure. As yet, the hero of the municipal assembly has been the man who could most eloquently declaim on the abstract question of the high or low rate; while he who has been venturesome enough to descant on the best and widest uses to which a rate, either high or low, might be applied, has been left to run for his reputation. To rectify this error is reform number one; for to strain at a farthing, and swallow a nugget, is an act fatal at the onset to social advancement.

Physical & moral conditions of districts, a point of inquiry.

The construction of a history of the physical and moral conditions incident to the district over which it presides, is a primary duty of each local parliament. It is true that, amongst honourable councillors, there may be found one here and there who, from long residence in his locality, has vague ideas regarding some of its leading advantages and defects. But such knowledge is exceptional, and of no practical utility; for what is local is of the general, and scraps of unbound information are but play toys for an idle wind of argument, which may make a terrible noise, but of which no one knows whence it cometh nor whither it goeth.

Viewed, however, in a general and philosophic sense, social facts of all kinds present in themselves no greater difficulties than do those of natural science; to which, in truth, they belong. The social world has its gradations and its epochs; its first, second, and third series. It has its revolutions, diurnal, annual, and illimitable. It may be put in the mental alembic, and reduced to certain elementary conditions. It has its simples, its usefuls, and its poisons. In fine, the man of general science may find in social studies the

choicest scientific pursuits, subject in the strictest sense to forms of experimental research, and to the rules of the inductive philosophy. These facts lie at the bottom of social reform; and social science can never progress until our amateur legislators learn them as a language, the A B C of which but few as yet know.

Education.

The best means for introducing into each locality a liberal, practical, and attainable system of education for the poorer and neglected portion of the population, constitute another important subject for the earnest consideration of all municipal boards. If they wait until the parliament of the nation makes a law on this point, independent of external pressure, they may possibly wait long, with half their removable social evils, which education only can affect, thick upon them. For this ultimatum they ought not to wait. Neither should trust any longer be placed on private exertions in this direction; for private enterprise, however well intentioned it may be, is subject to fluctuations, and often dies out after a short and brilliant career. We require permanent oases of education in the barren desert of English ignorance. Permanent ragged schools, permanent day schools, permanent evening schools for working men and women—one evening school to every twelfth gin-shop, for a rough example. These are desiderata which are required for each district; modified, of course, according to the character of the district itself. They can never be supplied, except by wise local legislation, or be permanently supported but by the cheapest in the long run of all taxation—an educational rate.

Protection of neglected infants.

We would presume to throw out a hint (following in the footsteps of Mr. Roberton) regarding the establishment, under municipal authority, of houses for the protection of young and neglected children during the labour hours of the day. In Paris an instructive experiment in this department of social science has been, indeed, for some years in operation.. In the day nurseries of the French capital, from two to three thousand babes are housed, tended, and, if old enough, taught, while the mother is out following her industrial occupations. Some improvements might, it is said, be made in these establishments, but this does not remove the fact that such institutions are greatly needed; for the system, as a whole, is based on most sound and humane principles, and is even more applicable to England than to France. In London, some twenty thousand infants, at least, who might be thus cared for, are left each working day of life to the careless protection of an

elder sister, the charity of a neighbour, or, far worse, to the narcotic mercies of a compound poison invented by one Godfrey, who had better never have been born. What say you, then, Mr. Municipal Councillor, to a few day nurseries on this side the Channel? If you have a child of your own, bethink you, on the strength of paternal love, whether an imitation on your part of this Parisian fashion would not only be—as such imitations usually are—highly popular, but calculated also to bring honour to your name, and greater happiness to your own fireside.

Play - grounds and gymnasia.

In every parish, large or small, there ought to be established gymnasia and play-grounds for children. Cooped up from morning to night in narrow, unlighted, unventilated courts, like celery plants banked from the light for the sheer purpose of being bleached, our younger denizens of large towns have no knowledge of the glowing sensation which one swift current of oxygenated blood communicates to the body. Hence they rise up incapacitated, physically and mentally—victims of struma, victims of sloth, victims of ignorance. But, as physical and mental vigour are one and the same, and as pure air and exercise are first principles in the natural code of health, so should they be provided for in any and every local administrative act relating to the health of the community.

Protection of outcast women.

The protection of outcast females, and the institution of reformatory dwellings for their benefit, are other subjects which should engage the attention of local legislative bodies, if rightly constituted. Labours in this direction would, in fact, be sanitary as well as social. Indeed, in their absence, sanitation can make but indifferent way, medical officers of health though there may be in hosts, able and active. For, mark you, honourable lords and councillors all, in Parliament, in vestry, or elsewhere, by these outcasts there is kept up the greatest, most universal, and persistent epidemic with which mortals are verily cursed; an epidemic which, in its way, we assure you, induces indirectly more real physical suffering, more misery, more diseases, more mortality, than all the other epidemics in total, cholera inclusive. It is at the same time a preventible epidemic, being the offspring of a social and removable evil. The key to the removal of this quiet and wholesale plague is presented in one sentence—find or patronize some useful and paying occupation, which shall supply the mere necessaries of life to the miserable creatures who propagate it. Degraded as a class, ranking as the lowest victims of

sensual loathsomeness, they themselves would gladly as the American slave see the day of their emancipation at hand. We pray you, then, forward it; and let not the Saxon race degenerate, as it is now fast doing, into a dense herd of consumptives, coughing up their lives, dying in their prime, and leaving to another, and yet another generation, the germs of their own premature decay.

Female occupations.

The general question of female occupations is one which requires to be carefully surveyed and discussed, irrespective of the reformatory results which might and would follow from the inquiry. So long as we commit the absurd error of talking of the physical and mental feebleness of woman, and yet see her worked like a dray-horse, we are erring grievously. In a correct organisation, there could be no anomalies of this character. They are unnatural, perverse, foolish. Is shirt making at fourpence a day always to remain the highest and most profitable occupation for the poor daughters of Eve? Are they never to be liberated from the troubles of sixteen, nay, even twenty-four hours per diem, in the brute exercise of factory labour? Is the temptation of selling their beauty to crime, to save their bodies from starvation, never to be removed? We hope better. But in these, as in other matters, the spirit of regenerative action must wake up in the municipal bodies, to whom the way will be open everywhere, if the will shall become good. The establishment of model lodging houses for the special advantage of industrious females, is, we believe, within the jurisdiction of municipal authority even now. It is impossible to say how gracious a boon an effort in this single direction would become, or how thankfully it would be received.

Encouragement of art and industry.

In the work of social advancement for men and women of all classes, the liberal encouragement of art and industry should never be neglected. Emulation is a certain inducement to progress; and there is no reason whatever, except apathy and narrow statesmanship, against the introduction into every large parish of an industrial exhibition or bazaar, which might be as permanent as the church, and where year by year, or even day by day, the intellectual talent of the locality might be exhibited to the mental advantage of all, and the profit of the industrial exhibitor.

Workhouse administration.

Workhouse management, again, requires from municipal authority stringent and immediate reform. Workhouses, from the fact that the occupants are under direct control, should be model institu-

tions. Dr. Sieveking's suggestion for the education of nurses might well be put into active operation; and the children here reared, if the learning supplied to them were practical, industrial, and artistic, might be turned out to become the most useful and intelligent servants of the community.

Medical charities.

Under an enlightened system of municipal administration, the medical charities of the different districts of every large town would be advantageously supervised. We would not suggest for a moment that the supporters of these charities should be shorn of that administrative power which their philanthropy has purchased. But the facts are notorious, that these institutions are often grossly mismanaged, because they are every body's property, and are therefore managed by nobody; while the medical staffs are unrewarded for their unremitting labours. With the governors of such charities, then, the municipal bodies might co-operate; they might depute one of their members as a representative in each charity; they might check selfish or spendthrift management in one case, they might give a helping hand in another—they might supervise all. The same observations apply to asylums for the insane, and to houses of refuge for the destitute supported by benevolent exertions.

Beggary & crime.

The stricter prohibition of street begging, and the lightening of the labours of the magistrate by removing the inducements to crime, are points on which we shall not dwell, because the suggestions already made would, if carried out, remove many of these evils as a matter of necessity. Some temporary alleviations are, however, required urgently; amongst which night refuges for the absolutely destitute, in parishes where workhouse accommodation is limited, are perhaps the most important, as means of raising human kind from one of the lowest depths of callous degradation.

Sanitary measures.

In regard to the great question of sanitary supervision, many of the duties of the municipal councils are embodied in that which we have already written. The removal of nuisances, the constant observation of disease, the supply of pure water, the building of baths and washhouses, the prevention of overcrowding, the securing of ventilation, the supervision of articles intended for human consumption—these duties are all understood by legislators, and will soon, it is naturally expected, be generally performed. Two hints only shall we offer in extension. First, that in considering the diseases of human

flesh and blood, those of the inferior animals ought not to be neglected, seeing that the laws of disease are universal, and that the intercommunication of disease between man and his lower earth mates is of frequent occurrence. Secondly, that the effects of various occupations on health and life form an inquiry, in this country, open to serious and immediate consideration. In France, as we have elsewhere pointed out, the governing bodies have reviewed this subject in all its bearings, and have legislated wisely upon it.

There are points connected with street accidents, the possibility of making the ordinary policeman a sanitary inspector under proper medical superintendence, and some others, to which allusion might well be made here. But, with another word, we must conclude.

A municipal reformer wanted.

In order that any new reform may be carried out in municipal government, one sterling, honest, comprehensive soul is waited for to lead the way. Is it possible that there is a want here? Can it be that, in all the municipal councils of England, there is not one man, dead to fear, but alive to truth, who, in the face of all opposition, misapprehension, prejudice, and selfishness, will proclaim the fact, that municipal government is as yet in a stage of almost helpless infancy, and who will shadow out that strong manhood to which it is expected to attain? For the honour of our country, we trust this is not the fact, and that the time will furnish the man. If it be urged that municipal governments have not the power to carry out many of the most needed social reforms, our answer is, let them then get the power. Active, business-like, wise, and liberal local governments, would do more in the way of reforming our general parliaments than aught else that could be conceived; for the people would soon detect who were their wisest rulers, and the vestry might become the training school for the leader in the state.

We have done. Some reader, perchance, as his eye falls on these last lines, may cry *Cui bono?* may lay down the book with a smile, and dub us utopian speculators. Ah, well! the reproof is tolerable. We have earnestly, honestly written the truth—not the whole truth, for that were impossible, but a fractional part at least. For the rest—

> "Our faith is large in time,
> And that which fits it to some perfect end."

PREVENTION AND CURE.*

SINCE the commencement of the modern period, when hygienic medicine began to undergo a revival after a slumber of seventeen hundred years, it has been an absurd practice to look upon the principles of prevention and cure as rival systems; not possibly as systems absolutely antagonistic, but as requiring, at least for their special advancement, distinct orders of intellect, education, and research.

This fallacy, which, even to the present moment, is firmly rooted in the majority of minds, is highly injurious both to the science of medicine and to the world at large. To medicine, because it makes a division where all should be one; to the world, because they who treat its diseases without being fully acquainted with the general principles of prevention, cannot know more than half their business; while they who undertake to prevent disease in the mass, without knowing intimately the nature of that which is to be prevented, are, of necessity, pretenders of no ordinary kind.

To understand clearly the reason of the distinctions which exist between the systems of preventive and curative medicine, it is necessary to take a comprehensive review of medical science as a whole, and of its position at various times in the intellectual world, since the success of each system belongs, to a certain extent, to a different phase of progress and civilisation.

The science of hygiene is a political as well as a medical study: it appeals to the mind universal; when it once takes root, it speedily indoctrinates all with its teachings; it models itself into a household truth, and commingles with the social, the moral, and even the religious elements of the mind. Admitted but briefly within the threshold of the citizen, it steps forth to take high place in the legislature, and becomes recognised eventually as a governing principle or law, against which to speak is to rave at common sense, and ignore the first feelings of self-preservation.

The curative system of medicine, on the other hand, has, as it is generally understood, a more exclusive meaning, being based mainly on the labours and knowledge of a distinct body of men, educated to its work. In a strict and

* Three pounds six ounces weight (avoirdupois) of Testimonials to Candidates for the appointment of Medical Officer of Health. Contributed by various authors and authoresses. London: 1856.

abstract sense, it assumes in some degree the non-necessity of prevention, since it claims to itself the power of acting as a safety valve to the world's indiscretions, ignorance, and frailties. Viewed in this light, it has been often held up to the gaze of human kind in the character of a life-restoring genius, and in many other poetical representations.

The times when the two systems here referred to have stood out most prominently in their isolated forms, are those when the educational status of the world has been at opposite points. The doctrine of absolute faith in the principle of disease prevention, indicates the existence of a high order of thought; of broad views of life and health, of diseases and their origins, of death and its meaning as a phenomenon of nature. The doctrine of absolute faith in curative medicine, vested in the hands of a separate sect or class, and exercised by them as by regal right, and without the assistance or interference of those upon whom it is exercised, indicates a lower standard of general knowledge; a too confiding spirit on the wisdom of a minority; a departure too wide from the law of self-preservation; an ignorance of the general causes of those evils which it is desirable to avoid; a blindness and therefore an unnecessary exposure to danger; an overweening and sudden fear at obvious dangers of all kinds, little and great; a hasty and thoughtless pursuit after that mode of rescue from disease which claims to itself the highest pretensions, and boasts, whether justly or not, of the largest successes.

The history of every age brings out in bold relief the truth of the statements here made. When old Rome in the midday of her life sought to avert the miseries of plague by the draught of the slave *medicus*, or the charm of the soothsayer, she presented the spectacle of a semi-cultivated nation, pinning its faith to an assumed curative system. When, in a later age, she sought to prevent these catastrophes by calling to her aid the mechanical genius of Vitruvius, and the medical learning of Celsus, she appeared in a second and advanced phase of civilization. And that which is thus true of Rome is equally true in regard to England, and to every other nation that has ascended from the lower to the higher levels of intellectual growth.

What is true of the whole is also true of the particular. Ask of the educated and uneducated man of the present day an opinion respecting diseases, and the way they should be met; and the position of the two systems of medicine will, in nine cases out of ten, be defined in the

replies obtained. In simple trust in the value of curative measures, the uneducated man will dilate at once on the skill of the doctor of his choice, whether learned professor or avowed charlatan. In his estimation, diseases are either accidents or dispensations; of their nature he knows nothing; but he knows, when he himself is subjected to disease, which man or mode is that in which he places most confidence. In this faith he confides fully; for of what use is the doctor, unless his instructions are followed? With the educated man, again, all Esculapians are nearly the same; *i.e.*, they are but scholars who have inquired a little further than himself, and instructors in a general rather than in a particular sense. With him, the way to health is not to take this nostrum, or follow that system, but to learn why men are ill at all, whence the causes of disorder, and how these causes may be removed or prevented altogether.

These broad and opposing views are, moreover, not confined to the public merely; they extend, practically at least, into the profession of medicine itself, and are there very prominently and even dangerously represented. One physician, claiming to himself the right of being considered only as a practical man, confines his labours exclusively to curative measures. He is never tired of speaking of his cases and cures; and overburthens every scrap he publishes with a history of the numberless articles with which his prescriptions have been enriched. He, by no chance, ever remarks that he ordered the window of his patient's room to be opened, or the fire to be kept down, or the sun-light to be admitted, but states with religious accuracy any such fact as that one grain of calomel was given every four hours. Another physician, looking only at the preventive side of the question, gives up practice altogether; asserts that all diseases are preventible, throws physic to the dogs, and straightway busies his life in exploring graveyards, uprooting nuisances, compiling vital statistics, or discovering new plans of ventilation. These individuals are the prominent professional representatives of the two systems; and their different positions are thus freely delineated, not for the purpose of praising one at the expense of the other, but to bring out more forcibly what is about to be shown, that such division of thought and action is pitiful, and that the preventive and curative systems of medicine are one and the same.

In the first instance, these systems are *one* in their abstract meaning; that is to say, there is no real difference in the beginning, the end, or the objects of either. The broad

and simple view of the question is, to look at absolute life and at absolute death, as at two distinct points; and at diseases of all kinds, merely as intermediate processes or steps between the one and the other. Thus observed, it becomes obvious that the removal of any disease by the removal of its cause—an act considered strictly curative—is nothing more than a continuation of that preventive act which would prohibit the cause of the disease altogether.

This is a mere truism; but one so little understood, that it is the very rock upon which the technical differences of the two systems of medicine are divided.

In the second place, the systems of prevention and of cure are each, in their separate forms, too limited for general application in the scientific treatment of disease; and this, because the questions relating to the treatment of a disorder should always have reference to the first causes of the disorder, as well as to the secondary results.

If any ground existed at all for disuniting the principles of preventive and curative medicine, it would be on the correct assumption that the body may be subjected to diseases from two sets of causes; *i.e.*, from causes external to it, and acting upon it previously in health, by interfering with one or other of its leading functions; and, secondly, from causes originating in the organism itself—the effects of certain chemical or physical modifications in its own economy.

If all diseases could be divided into two leading families based on these distinctions, it might be argued that the preventive and curative systems had each their special objects and duties. It might be said to pertain, for instance, to preventive medicine to deal with those disorders which spring out of external causes; and to curative medicine to deal simply with the second class, where the cause is in the organism itself. But, in the presence of the whole truth, this distinction or division of diseases, as arising from external and internal causes, does not hold good; since an interference with the functions of life by an external cause may not stop always at that point, but may give rise in the end to a series of systemic changes which are not removable on the removal of the cause, but persist independently and call for curative skill of the purest order.

The simplest example of this character is seen in the exposure of the body to intense cold. The first effects of such exposure are easily definable, and in most cases easily removable by the removal of the cause, which here is external

in the fullest sense of the word. In the effects of cold, indeed, no more is expressed than that the body is robbed of its caloric more quickly than it can make it from its own internal resources; but the offices of caloric in the animal economy are so important, that in the absence of it the vital processes are all stopped, the muscles become rigid, the blood circulates with difficulty, and death is threatened. But granting that some preventive hand removes this cause of arrest in the functions of life, it is not necessary that health should be at once regained. In some part of the organism, where the arrest of function has been most felt, a new series of molecular changes may be instituted, ultimately requiring even surgical treatment, which of all forms is most distinctly curative.

But the broadest example of the kind now named is met with in the action of poisons received into the healthy body, of whatever kind these poisons may be, and however introduced, by the lungs, by the digestive canal, or by direct inoculation. Here the cause is strictly external, and the first act in the treatment should consist in removing the poison; but the secondary act is, in its way, distinct, and has reference to the ultimate effect of the poison on the body, apart altogether from the abnormal conditions which first gave rise to the disease.

Take the exhibition of some narcotic vapour as an instance of this nature. A man has been made to breathe a certain proportion of chloroform, and in the body of that man there is superinduced a *bonâ fide* disease which might be defined and named according to its symptoms, and which undoubtedly would be if the cause were not so obvious. But in this case, as the disorder is produced by artificial means, the symptoms receive no collective name; and the treatment, therefore, which is adopted, is simply to remove the cause, and leave the body to right itself.

But even in this simplest instance of a disease arising from a known agent, and capable of arrest by its removal, *i.e.*, by an extension of that principle of prevention which would keep the agent away from the body altogether; even in this case, removal may not lead to the perfect restoration of the patient; for here, inoccuous as the agent is, *per se*, secondary systemic mischiefs may occur which may demand a form of treatment, curative in character, and utterly disconnected from the first step in the process of cure.

If this be true as regards the effects on the body of a simple volatile substance which is at command, and which

in ninety-nine cases per cent. quits the body without setting up any new molecular change, how much more true is it in the case of those organic poisons which no sooner are received into the system than they excite specific effects, leading to a virtual decomposition of the blood, to a modification of the secretions, and to structural changes in the tissues generally.

In the large family of diseases arising from causes of this nature, and including all those which have been called zymotics, the treatment should of necessity consist of a union of the preventive and curative principles. Yet these are the very diseases in which the disunion of these systems is most prominently marked: so that, when a great epidemic of these diseases breaks out, the preventives and the curatives at once take different ground.

The preventive, looking at the characters of the whole epidemic, ignores individual cases; and having formed some real or theoretical opinion as to the general cause of the disorder, thinks nothing about secondary results, but straightway modifies this water-course, or closes that burying-ground, or removes this or that nuisance, acting indeed throughout as one who, having obtained a supposed clue to the cause of all the mischief, thinks it enough to endeavour to remove this cause, leaving the actual sick to heal the sick, or else to be treated by others who do not understand the greater problems involved in the phenomena.

The curative, again, in these emergencies, forgets too commonly the leading causes of the epidemic; ignoring generalities, he looks only at individual cases. The patient is his business, and the symptoms; so the pulse is carefully counted and the character of the secretions is ascertained, and the sensations of the patient are gathered up, and eventually the treatment is based on these inquiries; so that if the circulation is quick and strong, and the skin hot and dry, there is an antiphlogistic system pursued; or in opposing circumstances, a stimulant system, and so on through a regular course of systematised treatment. In this way the grand mistake is committed of dividing causes from effects, and of proceeding as though they were distinct and unconnected phenomena.

Whether it is the greater error to omit the details of practice in reverting only to causes, or to overlook causes altogether in following out a routine of practice, based only on a knowledge of certain symptoms, and on certain formulæ supposed to possess special influences over those

symptoms, is a question rather curious than important, since either system in its naked pretence is bad enough; but, judging from what we know of the past, the error has been most glaring on the side of the special curative plan. This error is now day by day becoming less; but, a century or so ago, men were so blinded by it, that, in attempting to describe an epidemic disease, they sometimes omitted the true symptoms of the disorder altogether, and unconsciously supplied the vacancy with certain other symptoms, which resulted purely from their own acts and deeds, in what they considered sound curative treatment. To prove that we do not exaggerate in making this statement, we would refer briefly to the history of an epidemic which is recorded by the distinguished Chomel as occurring in Paris in the year 1749.

The narrator commences by remarking, that on a certain date an epidemic began to seize the younger portions of the population of the worst parts of the city. In the description of the malady, sufficient is said to lead to the supposition that the symptoms were of the febrile type, with soreness of the throat; but, as great exhaustion, pallor, and convulsions, are said to have led in a few hours to the finale of the cases, the mind becomes bewildered, and is led to imagine that some new disease is offered to special consideration. It is not until the treatment comes under review, together with one or two incidental notes, that the true facts of the case are descended upon.

The treatment pursued, says Chomel, was to bleed freely at the onset; if after a few hours the fever remained, to bleed again; and finally, if anything like convulsions returned, to bleed again. The modern physiologist need not be told what were the unknown symptoms which Chomel has described. But what, after all, was the epidemic? One isolated case gives the key to the whole, though accidentally named. This was in a young lady, whom the bleeding could not subdue: or else she was not bled so freely in comparison with her age—she was seventeen. Her case, therefore, differs from the others, in that her throat was swollen as well as sore, that her skin assumed a pink colour, and that in the course of her recovery the body became swollen all over. The mystery is cleared up, in the truth that a great epidemic of *scarlet fever* was transformed by supposed curative treatment into a great and fatal epidemic of *hæmorrhage.*

Errare humanum! Let us review the past charitably; let us learn from its faults all that may be gathered, but not

with charges too heavy on the heads of innocent offenders. There are hands yet to write our own doings, and to criticise our ignorance; and as we would that they should deal with their predecessors, so let us deal with ours.

Into such exaggerated mistakes as the one here related, we need not now fear again to fall; still the evil is not removed. When in Bermuda, a few years ago, yellow fever broke out, and the drinking water of the place, which was caught in tanks forming in almost every case friendly alliances with the cesspools, emitted an odour so execrable that the disease was by some attributed to the emanations from the water alone, the most active scientific treatment of a curative kind was carried out, the patient being meanwhile dosed with the decomposing beverage.

For many years past, the treatment of typhus has been sought after on principles purely curative; *i. e.* on principles which have their origin in the idea that certain set symptoms should be met by certain set formulæ.

Now, in regard to typhus, the sanitary teacher has long pointed out that it is the visitant of low, ill-ventilated, filthy localities, and that its main characters are those of diminished oxidation of the body; characters analogous to those arising from the gradual inhalation of a narcotic vapour. Yet so slight are the present bonds between the general and the special view of this disease, that only in these last days has the simple and obvious fact been proved by Stromeyer, that the best curative treatment of typhus is to pass pure air over the patient, in a steady and persistent current.

There are, again, many peculiar agencies, affecting whole classes of diseases, which deserve the attention of every medical practitioner, but which are often considered as belonging exclusively either to preventive or curative studies. Let one illustration bearing on this point suffice.

Writers on preventive medicines lay particular stress on the effects of temperature in producing, or rather in modifying diseases on the grand scale. They refer to the teachings of physiology, to demonstrate how thermometric influences throughout the world change and model the man. They point to the stunted Esquimaux at the pole, with his combustible provender, and slowly acting circulation. They point to the habitant of the equatorial line, with his light elastic build, and his circulation so quick that blood drawn from an artery or vein of his body is of the same colour; and they say, look at these differences! See you not that the Esquimaux, with his great chest and stomach, cannot

live in the tropics, for he takes in too much fuel, and blows too hard; nor can the equatorian live at the pole, for he has no stomach for oil, and can do but little in the respiratory department! And when they have drawn this broad outline, they follow it up, naturally enough, in regard to the effects of alternations of temperature on the body, in countries where such alternations are most marked.

But, unfortunately for this generalising spirit, the researches thus made are in themselves mere matters of interest, unless conjoined with the curative system; an union which at this moment has little existence. Except in the use of the warm bath, the true application of which has never been fully defined, the great influence of temperature on the sick remains for the most part a sealed book. Yet, its influence on the whole universe cannot be doubted; it is the *primum movens* of nature, the universal solvent *par excellence*. Its effects on the body, in health or disease, are most marked. Remove it faster than it is made, and the circulation is at once impeded. Arrange so that it cannot radiate freely, and the circulation doubles in its speed. In fact, in a physiological point of view, there is scarcely a symptom, or class of symptoms, incident to those two extremes of diseased action or pathology—hypinosis, evidenced in low typhus, and hyperinosis, as seen in acute sthenic inflammation—which may not be imitated by subjecting the body for long periods to extreme degrees of temperature.

As showing the influence of temperature on health, nothing more strikingly marked could be referred to than the mortality tables of the Registrar-General. "The power of cold on life varies", says Dr. Farr, "according to definite laws; the general result being that the danger, after thirty, of dying of cold, is doubled every nine years of age; for out of the same numbers living, to one death by cold, at the age of thirty, there are two at thirty-nine, four at forty-eight, eight at fifty-seven, sixteen at sixty-six, thirty-two at seventy-five, and sixty-four at eighty-four; a series which represents the relative mortality by cold at these respective ages, during five weeks, amongst two millions and a half of people."

These are startling facts; and, if they are not sufficient to arrest the attention of those who follow exclusively the curative principles of practice, let such turn to bed-side observation. Let them turn to the man under the influence of pneumonia, and watch the effect of alternations of temperature on the symptoms of that man's disorder. They will see then, if they observe dispassionately, that the influence of tempera-

ture on these, and many other diseases, is so great, that, left in the hands and at the discretion of ignorant attendants, it is often sufficient to overturn the results of all direct curative treatment, however judiciously recommended. Yet, so little is this important influence considered in the ordinary run of curative practice, that, except in the writings of the advocates of sanitary science, and of those who refer in the loosest way to the effects of warm climates on delicate or consumptive constitutions, the subject is scarcely thought worthy of notice in literature; while, practically, it is so disregarded, that in some of the hospitals of the United Kingdom a thermometer is hardly to be found.

In order, then, that the world may be benefited to the full by the learning of the physician, it is imperatively necessary that he should, in his ideas respecting the treatment of disease, no longer bind himself to one system of prevention and another of cure, but in every case consider these as one.

1. Because every disease springing from an external and preventible cause, cannot, as a general rule, be cured until such cause is ascertained and removed.

2. Because, in the majority of cases of disease arising from external sources, there is established a series of molecular changes, which continue even when the cause itself is taken away, and require distinct treatment, based on pathology and therapeutics.

3. Because, in instances where the body itself is the simple seat of the disease, the external chemical and physical influences to which the patient is subjected may materially modify the case, in regard to its progress and its leading characters.

Lastly, the union between the preventive and curative systems of medicine is demanded, for the sake of the innumerable discoveries which yet remain to be made regarding the origin of diseases. In a previous page, disorders were referred to as arising from internal and external sources; and in some broad instances this division is obvious enough. Still, our knowledge on these points goes only to show, that by far the greater proportion of diseases, of all kinds, have their origin in causes of a general and of an external character; and that when the types of disease are noted down one by one, and thus reasoned upon, it is hard to find any form or type that is not traceable, directly or indirectly, back to an external source.

This information, however, limited as it is, is peculiarly useful; since it shows, on the one hand, that no amount of research in the dead-house can, *per se*, reveal the beginning

of diseases; and, on the other hand, that the most extensive inquiries into the general causes of disease, whether physical or chemical, can throw but little light on the progress of diseases, and the means by which life is destroyed, unless in such inquiries the secondary results are followed up, and the disorganisations which arise are scientifically traced out.

If the arguments in favour of the unity of Hygiene and Curative Medicine have any weight at all, they should be specially enforced now, when, by an important political measure, Medicine promises to be more decidedly divided into preventive and curative sections, and when men holding high positions in science are reckless enough to give expression to an opinion so puerile as the following, which has actually emanated from the press since the moon before last was in her apogee: "I am sorry to say that, in the performance of new duties (sanitary duties), the failures have been considerable on the parts of persons of the best promise from success in curative treatment. The qualifications for preventive service are proved to be more distinct from the qualifications for curative service, and more rare, than the medical profession and the public generally are aware of."

To deny the special fact regarding the incapacity of some who have passed from the curative into the preventive system of medicine, as referred to by this authority, would be absurd; but the dogmatic inference he therefore deduces cannot be too speedily or emphatically repudiated, as false and dangerous in principle, as founded on narrow views of the universe of life, as tending to weaken the science of medicine by dividing her sons into parties and sects, and as opposed to the wisest and broadest teachings of history.

It is an unmistakeable fact, that in every instance when a truly great master in medicine has appeared, his greatness has been based on the comprehensiveness of his views regarding life, health, disease, and death, and on the nearness with which he has approached towards some central law or unit by which these are connected or governed.

But for this spirit of comprehensive research, endorsed on each page of his writings, the labours and thoughts of Hippocrates, never more fully appreciated for their wisdom than now, had long since been forgotten; but for the influence of the same spirit, the most useful discovery of modern times had remained unseen, and Jenner had lived in vain.

R.

HYGIENE IN FRANCE.*

The disasters of our army before Sebastopol have taught us that in war it is not enough that men should be taught to fight, but that they must be fed and clothed also. It has also been gravely hinted that, in some particular preparations for a campaign, we might gain by the example of our Gallic allies; so that in future it may not happen that, through want of precaution, our generals should have to borrow French great-coats to cover English soldiers, or French mules to carry English forage. It is not, however, in war alone that our continental neighbours are able to afford us useful hints. In France, the art and science of hygiene has been prosecuted much further than in any other country; and the knowledge thus acquired has been freely applied by the French government in the construction of laws and regulations, having for their aim the improvement of the public health.

With the object of inquiring into the laws and ordonnances in force in France, in relation to trading occupations, Dr. Waller Lewis received instructions from Lord Palmerston to make a concise report on them; and, to obtain a more correct and practical acquaintance with their operation, he was authorised to proceed to France, where, through the kind offices of M. Billault, the Minister of the Interior, and of M. Collet Meygret, the Director-General of Public Health, he was enabled to inspect all the public and private industrial establishments that the time at his disposal admitted of. The result of these investigations is contained in a report which has been presented to both Houses of Parliament, and which we have now in review.

The following is a brief chronological record of French sanitary legislation. In 1486, potteries were suppressed in Paris by royal proclamation, on the complaint of the inhabitants of the neighbourhood. In 1567, chiffoniers, knackers, and tanners, were driven from the interiors of towns. Up to the 12th February, 1806, such establishments were not placed under the surveillance of the government; but at this date the prefect of police was empowered to visit, with or without previous notice, any workshop, manufactory, or laboratory, where occupations were carried on prejudicial

* Report of the Laws and Ordonnances in force in France for the Regulation of Noxious Trades and Occupations. By Waller Lewis, M.D.

to health, or likely to occasion a fire. Where it was intended to carry on such occupations, the sanction of the police was to be previously obtained. These regulations, however, were not efficiently carried out; and it was not until the decree of 15th October, 1810, and the ordonnance of the 14th January, 1815, that effectual measures were taken for the regulations of manufactures in the interest of public health.

These last two measures, which were drawn up by the Minister of the Interior, in consultation with the Academy of Sciences, are those which at present regulate these matters. Factories are therein divided into three classes: 1. Those which must be kept at a distance from private habitations, and require a certain amount of isolation; 2. Those which do not absolutely require being kept at a distance from private dwellings, but which, from the nature of the operations therein conducted, require an assurance that such shall not constitute a nuisance or a danger to the neighbourhood; 3. Works such as may remain without inconvenience near dwellings, but which should be subject to the surveillance of the police. It is the duty of the authorities to see that the provisions of the law are properly carried out. Before permission can be obtained to pursue any of the occupations in the first class, it is necessary to forward to the police two plans, one showing the connexion of the proposed works with the neighbouring houses and lands, and another showing its proposed internal arrangements. Public notices have to be placarded within a radius of three miles, stating the intention of applying for a license. The mayor of the commune in which it is proposed to erect the works, holds a meeting of the inhabitants, to ascertain their feelings on the subject, and sends the result of his inquiry also to the police. The prefect takes the documents to the Council of Health (and afterwards to the Council of Prefecture, if there is any opposition). These formalities being gone through, the prefect sends the whole of the documents to the Minister of Commerce, with his recommendations, whatever they may be; they are then submitted for the advice of the Council of State, and the minister proposes to the chief of the Government an order of refusal or authorisation, which the prefect is charged with executing. Authorisation of the second and third classes is obtained from the prefects and sub-prefects of the department or arrondissement, who consult with the Councils of Health.

The following are examples of classification. First class: public slaughter-houses (*abattoirs*), knackers' establishments,

gut spinning, many chemical and metallurgical processes in which noxious gases are evolved, or which are liable to cause fires, such as the manufacture of fusees, chemical matches, or detonating powders; large furnaces giving off thick smoke, etc. etc. The second class includes examples where, from improved processes or arrangements, injurious tendencies are reduced, such as the manufacture of nitric acid from the decomposition of saltpetre by sulphuric acid in Wolf's apparatus, where gases are consumed or condensed instead of being diffused in the atmosphere, depôts of fresh hides, calcination of bones, candle making, tanning, sugar refineries, gas works. The third class contains slaughter houses in communes containing fewer than 10,000 inhabitants, cow keepers in towns with more than 5,000 souls, soap boiling, and many occupations which chiefly annoy by bad odours, noise, smoke, or danger of fire.

Of the abattoirs, placed in the first class, there are five; namely, Montmartre, Grenelle, Du Roule, Menilmontant, Villejuif, covering respectively, 8¾, 7¾, 5¾, 10¼, and 5½ acres. That of Montmartre is used more than all the rest together. They are situated on the right and left banks of the river, within the barriers, but a mile and three-quarters from the centre of the city. They were projected in 1810, but not completed until 1818. They are under the direct superintendence of the police; and in the decree which constituted them, and by which they are regulated, are numerous clauses relative to the public health. All the animals intended for the butchers' trade of Paris can only be slaughtered in one of these five public abattoirs. In addition to the buildings used for the lodging of the persons employed, the abattoirs of Paris are composed of four parts, entirely distinct:—

1. That where the animals about to be slaughtered are kept.
2. The abattoir proper, with all its accessories.
3. The place where are prepared the entrails of the slaughtered animals.
4. Lastly, those places where they prepare the tallow and fat.

In these establishments, besides the killing of animals, numerous processes are conducted, as the cooking the stomachs of oxen, cows, and sheep, intended for the tripe trade, and the preparation of sheep's and calves' feet, heads, etc., which necessitate isolated workshops. The melting of tallow, as it is not permitted to be carried on as a trade in Paris, also takes place in the abattoirs; but there are inconveniences attached to this system, which make its propriety question-

able, the greatest of which arises from the offensive smells. An improved mode of melting the tallow which is obtained from the fatty parts of the animals, has been in some cases adopted, and is expected to be enforced in all these establishments; it consists in placing the fat, mixed with a certain proportion of water, and a fiftieth part of the same amount of sulphuric acid, in an air-tight closed copper vessel, heated by steam. In the old method, the fat is melted in large coppers, holding eight cwts., and placed over an open fire. The tallow obtained by these processes varies in appearance, being by the acid preparation whiter and rather firmer, and serving for the purpose of making candles as well as the other; but the sulphuric acid it contains renders it unfit for leather making. One of the most important considerations in the construction of these slaughter houses is, that there should be an unlimited supply of water, and of the means for conveying it away; 20,000 gallons a day are required by one of the Paris abattoirs alone. There are stringent regulations for the preservation of as much cleanliness as the nature of such places will permit. The contractors for the liquid, refuse, blood, etc., must remove it every day at an appointed hour. However repulsive the nature of these occupations may be, it does not seem (from the nature of the information given in a letter of Dr. Waller Lewis to Sir George Grey) to interfere with the health of the workmen; on the contrary, he states—"They are particularly healthy, being free from bowel complaints, rarely or ever having attacks of cholera in seasons of epidemics. This is a fact which has constantly been given to me in evidence, both in France and England, that workmen engaged in manufactories connected with dead animal matter, are particularly free from disorders of this class."

Knackers' establishments are placed in the first class; and, as it is considered that at Montfaucon 400,000 horses and 1,500,000 dogs and cats have been killed, the necessity of an active superintendence is apparent. At Aubervilliers, near Paris, on an average, 6,000 or 7,000 horses are killed; they cost from seven to 10 francs each, and the carcasses are made to realise from £3 to £4 each. Thus the hair, skin, blood, muscular parts, entrails, tendons, fat, even the shoes and nails, are all utilised, some for food of animals, others for commerce or for agriculture. The skin and hair are first removed and disposed of; then the animals are cut up and boiled in air-tight iron cylinders, under a high temperature; the bones are afterwards separated from the flesh, and are

sold to the manufacturers of animal black; the flesh is dried, ground, and sifted, and is converted into manure. The intestines of the animals, which have to be converted into receptacles for sausage-meat, and twisted into musical cords, have to undergo scraping, cleansing, inflating, deodorising, and bleaching, by exposure to the fumes of sulphur. The stench is said to be so horrible in the places where these operations are carried on, as to require some little courage on the part of any one desirous of visiting them. Nevertheless, Parent Duchatelet affirms that the emanations from these gut establishments may be breathed with as perfect impunity as the most agreeable odours. On the other hand, MM. Chevalier and Guérard report that, in the visits they have repeatedly made to these establishments, they have been informed that workmen, at the commencement of their work, are in a few days attacked with fever, and derangement of their digestive functions, which require a course of purgatives for their relief. The opinion of the latter gentlemen does not militate against common sense, which would naturally induce us to believe that that which is so repugnant to the smell, and revolting to the sight, may be injurious to the health. Chlorides, carbon, and the disinfecting powder of MM. Payen and Salmon (composed of calcined earth containing vegetable matter, and acting by means of the finely divided charcoal it contains), are used to diminish the smell arising in gut spinning establishments. The production of animal charcoal from bones is carried on in France so largely, as to require large importations of bones from abroad. The charcoal is chiefly used in the clarification of sugars and vinegars. "The clarification process for sugar consists in adding three kilogrammes of animal charcoal, in fine powder, to a hundred kilogrammes of raw sugar, with one or two kilogrammes of albuminous matter, coagulable by heat. Bullocks' blood, beaten, and thus deprived of its fibrin, then mixed with four times its volume of water, is made use of for this purpose."

Unlike London, Paris does not possess the advantage of a system of drainage, and all the night-soil has to be removed by manual labour; which is done either by a periodical emptying of the cesspools, or by means of what are termed *fosses mobiles*, or removable receptacles. In the forest of Bondy, near Paris, is a large establishment for the manufacture of artificial manure, whither the night-soil of nearly the whole of the capital is conveyed. This removal is contracted for by Messrs. Richer and Co.; and the town of Paris receives eighty-five *centimes* (about 8*d.*) for every cubic *mètre*

(220 gallons) of solid and liquid that enters the factory. At the present time, when so many projects are advanced for the interception of the sewage which flows into the Thames, it is worth while to bear in mind that, if an establishment of this kind can afford to pay for it, under the difficult circumstances under which it is transported, it is extremely probable that, if means could be adopted for the reception of the London sewage at the points where the sewers open into the river, and if from thence it could be conveyed away by barges, the utilisation of this substance would probably more than pay for the expense of its collection. The liquid portion of the sewage could be allowed, by a process of filtration, to run off by a subaqueous canal to any distance, leaving the solids in the reservoir for removal. In the French establishment alluded to, sulphate of ammonia is obtained from the liquids; the solids are dried, and used as a manure in powder. The smell of this factory extends to a great distance, and is very bad, and much complained of in the neighbourhood.

Cow-keeping has not evaded the vigilance of the French government. This is a very important subject, since the condition of the milk is much dependent upon the healthy state of the cows. The regulations which exist have for their object to prevent overcrowding of the animals, to ensure cleanliness and a sufficient ventilation in the stables.

The influence of chemical processes used in various manufactures, in affecting the health of the manufacturer, does not escape attention in the French capital; and the precautions enforced are in many cases attended with the best results.

At the manufactory of white lead in Paris, conducted by M. Besançon, all the men employed, according to Dr. Waller Lewis and M. Trebuchet, the Chef du Conseil de Salubrité, at the Prefecture of Police, appeared in perfect health; there was no blueness of the gums, nor were any of the signs of lead poisoning to be observed; nor were complaints ever heard from the workmen since the occupation had been carried on under the existing improvements. This is a great result, considering that 5,000 kilogrammes (about 98½ cwts.) of white lead are made and ground daily. The nature of the preparations are as follow; we quote Dr. Lewis's words:—

"No man is allowed, under any circumstances, to continue at this work more than seven days consecutively. In quitting their work, the men are obliged to wash their hands and face in water containing a solution of sulphuret of potassium; secondly, in water holding clay in suspension; and thirdly, in pure water. They must use these ablutions whenever they cease work, before taking

a meal, or retiring for the day. These are among the regulations of the police, and are made known to the workmen by placards printed and fixed up in various parts of the factory.

"In the subsequent process, the lumps of white-lead are ground under water, and no powder, vapour or smell can thus escape. The white lead is afterwards separated from water by pressure, placed on plaster of Paris, and exposed to hot air until it is quickly made anhydrous; after which, it is placed into receiving boxes, where it is broken into small pieces, by a few gentle taps of a hammer, without creating a dust. After this, it is immediately mixed with oil, with which it is ground. No lead is sold in the factory unmixed with oil.

"After the drying, as the lead before admixture with the oil must be in the form of an impalpable powder, it is passed through very fine sieves. This process—which in many manufactories is still done by the workmen themselves, who shake the powder through the sieves—is performed at M. Besançon's factory in hermetically-sealed closets or small rooms, in sieves supplied with the lead, and having their shaking motions communicated to them by the steam-engine that works their grinding-mills."

In a sanitary point of view, the difference between the English and French modes of dressing leather deserves also a brief notice. In converting skins into leather, the first thing is to remove the hair, which is done in both countries by the action of lime; in the next process, by which the lime is removed from the skins, the method differs. In England it is done by the action of the putrified dung of animals, particularly of dogs; and it is said that three or four hundred men are occupied in the streets of London in picking up this excrement and collecting it in a bag, which they carry at their side. Their collection is purchased by the tanners under the name of "pure". It is kept in mass until the emanation of carbonic acid, sulphuretted and phosphuretted hydrogen, indicate its putrefaction and fitness for use. The smell necessarily becomes a disgusting nuisance, and pervades the whole establishment. In France, the process of getting rid of the lime in tanning is simply effected by complete and free washing in liberal quantities of water, by pressure, and by use of an engine for the purpose, known by the name of "appareil purgeur, *Système de Artus frères, vendeurs de l'Appareil*, 1853." By the aid of two such machines, 1,200 smaller skins can be finished off in a day.

B. Daniel.

THE EPITOME OF SANITARY LITERATURE.

PARASITIC DEVELOPMENTS IN THE HUMAN BODY.*

WITHIN these last two years, great advances have been made in relation to the development of parasites in the bodies of men and animals. It has long been known that the class of animals known as the entozoa are by no means uncommon occupants of the animal body. They exist in several conditions; among which are the cestoids, illustrated by the common tape-worm; and the cystic growths in which the entozoa are only partially developed. Dr. BARKER, in his interesting paper, has related a case, in which the cystic entozoa were developed in the kidney of a patient under his care.

A point of great interest to the sanitarian, on which Dr. Barker dwells, is, that the cystic entozoa may be taken into the body in food, and that thus received they may and do give rise to tape-worm; and *vice versâ*, that the introduction into the body of the segments or the ova of tape-worms, may if thus taken give origin to the cystic variety. The organs of the body, in which the cystic entozoa are most commonly located, are the liver, the cellular tissue, the muscles, the chambers of the eye, the brain, and the abdominal cavity. In the human subject, fatal results rarely occur from the presence of cystic entozoa; but Schleusner, in his *Medical Topography of Iceland*, describes that the inhabitants of that island are at this time suffering from the presence of these entozoa in a remarkable degree. The liver, peritoneum, and subcutaneous tissues, are the parts of the body most commonly attacked. About a sixth of the whole population are thus affected; and the result is, a long protracted illness, terminating in death. Von Siebold, a distinguished authority, thinks that the disease thus occurring is occasioned by the people swallowing accidentally the ova of tape-worms thrown off by dogs, of which immense numbers are kept in the island.

Dr. Barker's little work is a most useful addition to sanitary literature.

NOTES ON THE MINING DISTRICTS.†

FROM a Report (1855) by Mr. H. S. TREMENHEERE, the

---

* On Cystic Entozoa in the Human Kidney. By T. HERBERT BARKER, M.D. London: 1856. Hamilton and Adams.

† Report of the Commissioner appointed under the Provisions of the Act

commissioner appointed under the provisions of the Act 5 and 6 Victoria, c. 99, to inquire into the operation of that Act, and into the state of the population in the mining districts, we learn that females continue to be employed in the collieries of South Wales; and, as an evidence of the degradation of these female miners, we are told that in some cases they work in men's clothes, to avoid discovery.

The employment of boys under ten years of age under ground, has also become much more general than hitherto; South Wales, Staffordshire, and Yorkshire, being the localities where they are employed to the greatest extent. So general, indeed, is this practice, that one manager is stated to have alleged, as his reason for refusing to abandon it, that "the other managers were allowing it." This occurred in a district where, on two occasions, considerable expense had been incurred in prosecutions.

The frequent and generally unreasonable strikes among colliers, their almost universal habit of working less the higher their wages are, their sacrifice of their children's interests to procure themselves more means of self-indulgence, and their gross ignorance, are facts as patent now as when the Act was passed, in 1843, and prove the necessity of educating at least the youthful portion of this large section of the population.

The author of this Report, on former occasions made suggestions on the subject of education, which were examined by a Committee of the House of Commons, who made certain objections to them. As far, however, as we can judge from the reprints before us, the education of children in the mining districts is making some amount of hopeful progress. The system of giving money prizes, originating through Mr. Tremenheere, works well. The object of the associations established for this purpose (now seven in number, five being in operation) is to offer inducements for children to attend school in the mining districts, especially children of the mining population; to remain longer at school, until they have received the rudiments of a sound education, instead of leaving school, as has been the general habit, at so early an age as to make the little they learn almost entirely useless to them hereafter. In Staffordshire alone, the candidates examined for the prizes of the year 1854-5 amounted to 619;

5 and 6 Vict. c. 99, to inquire into the Operation of that Act, and into the State of the Population in the Mining Districts. Presented to both Houses of Parliament by command of Her Majesty. London: 1855.

of whom 365 were boys, and 214 girls. It appears, however, from the report of the Rev. J. P. Norris, Her Majesty's Inspector of Schools for Staffordshire, that the children of colliers and miners amount to only 6 per cent. of those who presented themselves for examination under these prize schemes. Mr. Norris' report contains his conviction that "nothing short of legislative interference can redress the educational balance of these mining districts. At present the divergence between the employers and the employed is increasing every year. Every year's delay brings us nearer to a crisis."

Quotations from Mr. Herbert Mackworth, an experienced Inspector of Mines, show that the care on the part of the employer for the social and sanitary welfare of the miner is somewhat increasing; but that far greater attention is paid to these important matters on the continent. The works stretching from Valenciennes to Aix-la-Chapelle are cited in illustration; where the machinery, top of the pit, is enclosed by enormous buildings, in which are rooms for dressing, undressing, washing, clothes drying, etc. Even in 1826, the Anzin Company erected bathing halls for the miners, supplied with waste hot water from the pumping engines. Several of the continental mines have barracks, fitted for those men who only return home once a week; and an accident room, with remedies for sudden illness and accidents, and printed directions for preliminary measures are frequently to be met with.

Mr. Tremenheere states that a mining village, with gardens, schools, etc., has this year been nearly completed in Scotland, by the dowager Lady Ruthven, on her estate of Winton, East Lothian, which will nearly equal those on the continent. He found in this village lately, many remnants of prejudice and ignorance, on subjects of the first importance to their health and well-being.

We learn, finally, from this Report, that the rapidity with which miners die out, and the increasing demand for minerals, already causes difficulty in keeping up a supply of miners adequate to the demand; and the author of the Report points to this as suggesting to employers the expediency of doing all in their power to make miners satisfied with their lot, and as affording a warning against needless legislative pressure as regards the labour of their children, which might tend to divert them to other occupations.

THE PREVENTION OF DEATH BY CHLOROFORM.*

Dr. Snow states as an absolute fact, that all the accidents which have occurred during the exhibition of chloroform, have been caused by the air breathed by the patient being at some moment too highly charged with the narcotic vapour; so that, to prevent such accidents, it is only necessary to ensure that the vapour shall at all times be sufficiently diluted with air. In commencing the inhalation, the patient should take in a vapour diluted with not less than 95 per cent. of air. Artificial respiration, promptly applied, is the only measure which promises success in cases of accident from chloroform.

THE "LANCET" SANITARY COMMISSION.†

The document before us is written in defence of Dr. Hassall, the well known and successful microscopist. We wish to take no partisan view on the question here discussed; but a careful perusal of the work only re-excites in us a regret we often feel, that in science the leaven of jealousy is ever fermenting. The facts of the present case seem simple enough. Mr. Wakley, the editor of the *Lancet*, originated an idea of investigating the subject of the adulteration of food on a grand scale. He placed the inquiry in the hands of Dr. Hassall, who conducted it with an accuracy of research which is deserving of the highest praise. In the course of the inquiry, Dr. Hassall very properly took chemical opinion, whenever it was required, of Dr. Letheby. When the labours of the inquiry were concluded, some friends of Dr. Hassall wished to present him with a testimonial, in recognition of his public services; upon which Mr. Wakley considered that any testimonial of this kind was due to him for having conceived the task, supplied the costs of its prosecution, and borne the probable legal responsibilities. This was natural enough; but the presentation of a testimonial to Mr. Wakley by his friends and admirers, need not have interfered with the presentation of a similar mark of respect to Dr. Hassall.

We deeply regret this controversy: it is humiliating to science generally. Dr. Hassall is only known to us by his published writings, but these we have ever read with interest

* Further Remarks on the Prevention of Death by Chloroform. By John Snow, M.D. London: 1856.

† The Correspondence relating to the *Lancet* Sanitary Commission Examined. By James Cæsar Benford, Esq., John A. Power, L.M., M.A., and Raymond S. Daniel, M.A. London: 1856.

and pleasure; and, on our parts, it required no such treatise as the one under notice to sustain the conviction that he is a man who has worked laboriously and usefully, and who deserves the recognition of his country much more than half the men in high places, who receive public thanks without a murmur, for doing those things which ought not to be done, for leaving undone those things which ought to be done, and for having no health in them.

DIET OF CHARITABLE INSTITUTIONS.*

Dr. Routh, having been requested to provide a new Diet List for the inmates of the Hill Street Female Refuge, in London, has not only done so, but has published, in a very readable form, the results of the inquiries which he was led to make into the alimentary value of various articles of food. He has taken into consideration: 1. The relative value of different articles of alimentation; 2. The quantity and quality of food; and 3. The diet recommended.

In speaking of tea, the author shows that there is a great waste of its nitrogenised constituents in the ordinary infusion; and he suggests the use of tea-bread—a modification, in fact, of the brick-tea which is eaten by the Mongols and other neighbouring races:—

> "If the refuse of leaves left in the tea-pot be carefully collected, dried, and reduced to an impalpable powder, and mixed with flour,—and especially that of the poorer kinds of grain,—the mixture makes a highly nutritious bread. I have made the experiment with one-third tea and two-thirds flour. The result is, a very edible bread, but with a black colour and a very strong taste of tea. A smaller quantity should therefore be mixed, and the result would be, a bread having about 20 per cent. of nitrogenous matter, in lieu of only 16, which the best white bread contains."

This is an important suggestion, which might, especially in times of scarcity, be turned to useful application. To show what an amount of nutriment might be thus applied, Dr. Routh calculates that, from January 1836 to January 1850, the amount of waste in the tea imported was 45,566,119 lbs. of caseine, and 3,261,794 lbs. of theine—both nitrogenised, and hence nutritive constituents.

This is but one among many important remarks with which the work abounds.

---

* The Cheapest and most Nutritious Food for Charitable Institutions and the Poor. By C. H. F. Routh, M.D. pp. 60. London: 1854.

COMPOSITION OF BREAD.*

THE determination of the amount of water and of available nutritive material in bread, is a subject to which but little attention has been paid in this country; and hence the value of bread as an article of diet has never been correctly ascertained. Dr. DOUGLAS MACLAGAN finds that the amount of moisture in bread is less than has generally been calculated; but his results agree most closely with those of the French chemist, Payen. According to the last-named chemist, the percentage of moisture in French white bread is 36; and in the present ration bread of the French army, 35. Dr. Maclagan finds the average percentage in bakers' fine bread to be 35·75; in fine home-baked bread, 33·93; in bakers' coarse bread, 34·91. From his analyses, he calculates the average produce of a sack (280 lbs.) of flour to be ninety-three and a half quartern loaves, in the hands of the baker; and this agrees very nearly with the estimate given by bakers in Edinburgh, who hold ninety-two such loaves to be the average produce of a sack. In home-baking, the gain is so small (being only two quartern loaves per sack), that Dr. Maclagan doubts whether there is much economy in the domestic process. Unfermented bread contains more water (about 40 per cent.); and therefore, though suitable under certain circumstances, is not defensible on the score of economy.

The amount of azotised matters in bread has also been calculated by Dr. Maclagan. In bakers' fine bread, he finds 7·55 per cent.; in home-baked bread, 7·29; in coarse bread, 7·99. He observes that the report furnished by Drs. Alison and Christison to the Poor-Law Board places the quantity of azotised material too high—10·5 per cent. The average ratio of azotised to non-azotised material in bread of all kinds, taken together, is as 1 to 7·3. The amount of moisture does not appear to be, as some have maintained, in proportion to the amount of gluten; but may be in some way connected with the form in which the nitrogenous matter is present. Nor do the experiments of Dr. Maclagan confirm the idea that the amount of saline matter in bread influences the quantity of water; for example, in several analyses, the percentage of water ranging from 33·02 to 41·73, the ratio of

* On the Composition of Bread. By DOUGLAS MACLAGAN, M.D., F.R.S.E. Read before the Chemical Section, British Association, September 18, 1855. Pamphlet, pp. 14. Edinburgh: 1855.

solids to one part of ash varied in the most irregular manner, from 24·9 to 74.

It is impossible to obtain an estimate of the average amount of salt in bread; since one baker differs from another in his practice, and from himself at different seasons, more salt being used with new than old flour. The result of Dr. Maclagan's inquiries, however, was that the salt was usually added in the proportion of 4 or 4½ lbs. to the sack of flour, or about 1·15 per cent. of the weight of bread.

In conclusion, Dr. Maclagan says that he has not been able to detect more than small and doubtful traces of alum in the bread of Edinburgh; and certainly not the "large crystals of alum", which have been stated to have been found in London bread.

SALT IN AGRICULTURE.*

Mr. Northcote, in inquiring into the use of salt in agriculture, arrives at the conclusion that "agricultural salt is a most energetic absorbent of ammonia; but that, at the same time, its agency does not seem to be altogether a permanent one: it will collect the ammonia, but it is questionable whether it can retain it for any great length of time, because, in the very decompositions which happen in order to render the ammonia more stable, salts are formed which have a direct tendency to liberate ammonia from its more fixed combinations. It may, however, retain it quite long enough for agricultural purposes: if the young plants are there ready to receive it, its state of gradual liberation may be for them the most advantageous possible; and to this conclusion all experiments on the large scale appear most obviously to tend. It is described as an excellent check to the too forcing power of guano; and from M. Barral's experiment we see that it either prevents the too rapid eremacausis of the latter, or stores up the ammonia as it is formed. As a manure for growing crops, all experience and all theoretical considerations therefore show it to be most valuable."

These results regarding the power of salt in absorbing ammonia, while strictly original, are very important in a chemical sense. We hope the learned author will pursue this subject further, and in other directions.

---

* On the Function of Salt in Agriculture. By A. Beauchamp Northcote, Esq., Senior Assistant in the Royal College of Chemistry. London: 1856.

ORIGINAL COMMUNICATIONS.

COKE POISONING IN A CHURCH:

NOTICE OF THE NOXIOUS EFFECTS OF EFFLUVIA FROM A COKE-FIRE ESCAPING INTO A CHURCH DURING SERVICE.

By JOHN DAVY, M.D., F.R.S.

The noxious effects I am about to describe, with the hope of supplying a preventive lesson, occurred in the new church in Ambleside, on Sunday, January 6th, during the morning service, and were unquestionably due to the escape of mixed gases, evolved from ignited coke used in the air-heating apparatus designed for warming the building.

As preliminary, I may mention that the church is of such a size as to have sittings without galleries for above nine hundred persons; that it is lofty, open to the very rafters, and of a capacity equal to about 150,000 cubic feet. It may be further right to state that the warming apparatus consists of a stove, placed in a crypt under the chancel at the east end, and of a single flue, communicating with the open air, and running through the basement floor of the building under the middle aisle, in which are three grated openings for allowing the air, heated by a cockle, to pass; two of which, the more western ones, were open; the third, the eastern, closed. In consequence of the apparatus affording an inadequate supply of heated air, precautions were taken to confine it, and exclude the cold air; the windows were all closed, as were also the doors, after the commencement of the service, only one having been opened previously, and that to leeward.

At the time, the atmosphere was in a state not favourable to the diffusion and dispersion of smoke or vapour, but rather to its stagnation and accumulation: the sky was overcast with dark, low clouds; the little wind that there was, was southerly; and so mild was the day, that bats and insects were abroad, and were seen on the wing between one and two o'clock in the afternoon.

I proceed now to the effects. At the commencement of the service there was an unpleasant smell perceived, like that from coal-tar, or of smoke from an ill burning fire; and when the sun shone, which it did at short intervals, its light was peculiar, from the hazy quality of the vaporous air. But no apprehension was felt of anything injurious, nor was any

alarm excited, till towards the end of the communion service; when, one after another, children and young people began to go out from feeling unwell, the numbers rapidly increasing, till, shortly after the commencement of the sermon, the alarm became so general, almost amounting to a panic, that the minister thought it necessary to abruptly bring his discourse to a termination; when, though there was no rush to the open air, there was no delay on the part of any one present from seeking it. Of the scene outside, from the many sufferers, some prostrate, some in danger of life, and variously affected by the noxious air they had breathed, it would be difficult to give an idea. Hardly a person, out of a congregation probably of four hundred at least, did not feel more or less unwell, or was not alarmed on account of a child or near relation seriously affected. Nor was the alarm confined to the spot and the witnesses and sufferers there; it presently spread to the town,—one of the first who spoke of what had happened saying that "all the people in the church were dead":—a good example, I may remark, of the exaggeration that is sure to be run into on an occasion of the kind. And it was not the only one: even the accounts which appeared in the papers, given by persons writing from Ambleside, were not free from gross mistakes, showing how little trust is to be placed in what is hastily published of passing events.

I shall attempt now, from such information as I have been able to collect, especially from Mr. Wm. Fell, the esteemed surgeon of the place, who zealously gave his assistance on the occasion, to describe the principal symptoms of those who suffered. I have already mentioned that scarcely any one altogether escaped suffering. The most robust, of mature age, of both sexes, experienced least bad effect; little more than headache of some hours duration. Those who experienced the worst effects, were children, and young delicate women. Vomiting was a common symptom in the former, and was attended with great prostration of strength and feebleness of the heart's action, and a tendency to fainting. Those who threw up the contents of their stomachs were the soonest to recover. Tremors of the hands and feet, with diminished sensation, threatening paralysis, occurred in many instances of the latter. Oppressed breathing, with uneasiness or pain of chest, was pretty commonly experienced. Next to the very young and delicate, those advanced in years and the plethoric seemed to be most affected.

Apart from age and constitution, position—that is, in rela-

tion to the openings of the flue—was not a matter of indifference in relation to the severity of the symptoms; those suffering most who were nearest the openings, especially at the west end, where the majority of the children, those belonging to the Sunday school, were seated, not in pews, but on open forms, so that nothing screened them from the flow of the vapour in their direction. That there was an accumulation of the noxious agents in this portion of the church, was indicated in a visible manner when the doors which are towards the west end were thrown open, by the stream of thick misty air which then rushed out.

Of those affected, the greater number were pretty well before the following day. In a very few instances, the indisposition produced continued—but gradually diminishing—for several days. In one of the most severe cases, a young lady of about seventeen, the recovery was not complete for nearly a week, and hardly then. She fainted in the attempt to walk home, was afterwards hysterically convulsed, had a feeling of extreme feebleness and languor, with oppression and pain of chest, and loss of appetite. In a large number of other instances, something similar occurred. The maximum of noxious effects was experienced after leaving the church and going into the open air.

Of the organs affected, the lungs, the heart, and the nervous system, appeared to bear the brunt of the effect. In no case that I could hear of were the bowels deranged; and the stomach probably was only sympathetically so, and so also the voluntary muscles. In the only instance that I heard described, in which attention was given to the premonitory symptoms, the progress of the morbid action, it was that of a delicate boy aged about twelve; his mother, who sat by him, noticed his incessant yawning, and this for a considerable time before he was taken ill, when he became so ill and suddenly enfeebled that he required to be carried out.

I have said that the effects were unquestionably owing to the escape of the mixed gases produced by the ignited coke, the fuel used in the stove. The evidence on this point is very clear. There was no other source of the noxious effluvia; and that the coke employed was of a quality capable of yielding noxious gases in burning, other than carbonic acid, might even *à priori* be inferred, inasmuch as it burnt with flame; a fact of which I had assurance from the man who attended the stove, and which I have confirmed by trial, using small portions of the identical fuel; these I found, especially the heavier kind, to burn when ignited with

a pale blue lambent flame, similar to that of carbonic oxide.*

Some other gases might have been produced at the same time, such as carburetted hydrogen, and sulphurous acid gas; but it is not necessary to insist on these, as their presence can only be conjectured. If present, they could only be in very minute quantity, especially the latter; for I did not perceive the odour of it, nor was cough one of the common symptoms of those seriously affected.

Moreover, that carbonic oxide and carbonic acid were the gases chiefly concerned, seems to be pretty certain from the symptoms, were these considered alone. I shall give some extracts from the writings of those who have made trial of the more deleterious one, carbonic oxide, in order to impress the danger more strongly on those ignorant of the science of the subject. Sir H. Davy, in his *Elements of Chemical Philosophy*, states that "carbonic oxide may be taken into the lungs, but is fatal to animal life": adding, "I once took three inspirations of it, mixed with about one-fourth of common air; the effect was a temporary loss of sensation, which was succeeded by giddiness, sickness, acute pains in different parts of the body, and extreme debility: some days elapsed before I entirely recovered." According to Clement and Desormes, it produces when inspired giddiness and fainting fits.† They found that birds put into this gas "dropped down dead before they had time to take them out."‡ When breathed nearly pure, its intensely noxious effects are well displayed in the following quotation, in which are described most of the symptoms experienced by the several individuals who suffered on the occasion under consideration. Sir H. Davy says: "I made three inspirations and expirations of the hydrocarbonate (so carbonic oxide was then called). The first inspiration produced a sort of numbness and loss of feeling in the chest and about the pectoral muscles. After the second inspiration, I lost all power of perceiving external things, and had no distinct sensation except a terrible oppression on the chest. During the third inspiration, this feeling disappeared; I seemed sinking into annihilation, and had

---

* Probably this gas is always produced when coke is used in fires with excess of fuel, and will escape unburnt if the surface fire be not powerful. Carbon, it is well known, acting on carbonic acid at a high temperature, takes from it one proportion of its oxygen, converting it into carbonic oxide, so that two volumes of the latter take the place of one of the former.

† Gmelin's Handbook of Chemistry, vol. ii, p. 89.

‡ Thomson's System of Chemistry, 5th ed., vol. ii, p. 24.

just power enough to drop the mouth-piece from my unclosed lips. A short interval must have passed, during which I respired common air, before the objects about me were distinguishable. On recollecting myself, I faintly articulated, 'I do not think I shall die'. Putting my finger on the wrist, I found my pulse thread-like, and beating with excessive quickness. In less than a minute I was able to walk, and the painful oppression on the chest directed me to the open air. After making a few steps, which carried me to the garden, my head became giddy, my knees trembled, and I had just sufficient voluntary power to throw myself on the grass. Here the painful feeling of the chest increased with such violence as to threaten suffocation. At this moment, I asked for some nitrous oxide. Mr. Dwyer brought me a mixture of oxygen and nitrous oxide. I breathed this for a minute, and *believed* myself relieved. In five minutes, the painful feelings began gradually to diminish. In an hour they had nearly disappeared, and I felt only excessive weakness, and a slight swimming of the head. My voice was very feeble and indistinct. I afterwards walked slowly for about half an hour with Mr. Tobin, jun.; and, on my return, was so much stronger and better, as to believe that the effects of the gas had disappeared, though my pulse was 120, and very feeble. I continued without pain for near three-quarters of an hour, when the giddiness returned with such violence as to oblige me to lie on the bed; it was accompanied with nausea, loss of memory, and deficient sensation. In about an hour and a half the giddiness went off, and was succeeded by an excruciating pain in the forehead and between the eyes, with transient pains in the chest and extremities. Towards night, these affections gradually diminished; at ten, no disagreeable feeling except weakness remained."*

Of the ascertained effects of carbonic acid I need not be so particular, as they are so well known. Who has not heard of the too often repeated experiments in the Grotto del Cane? I may briefly mention the trials which Sir H. Davy made of it on himself. He attempted to breathe the gas pure, and also diluted with common air. Unless considerably diluted, he found that it occasioned a convulsive closure of the glottis, preventing its admission into the lungs. He breathed, he informs us, a mixture of three quarts of carbonic acid and seven of common air, for near a minute. "At the time, it produced a slight degree of giddiness, and an inclination to

---

* Researches in Collected Works, vol. iii, p. 279.

sleep; effects," he adds, "which rapidly disappeared after he had ceased to respire it, without being followed by any other affections."

As to the manner in which the noxious gases got admittance into the air-flue, a conjecture only can be offered, as no examination has yet been made of the apparatus, and cannot be made without laying open the stove. The great probability is that fissures have formed in the brickwork, and that through them the gases passed from the fire into the air-flue; indeed, there seems no other mode of explaining the accident.

In giving the above account, I have been minute in consideration of the importance of the subject—that of warming public buildings, and the too little attention commonly paid by architects to a matter, as we have seen, involving risk of life. In the contract for building the Ambleside church, the mode of warming it was not even noticed in the specifications; and though the flues were made under the superintendence of the clerk of the works, it was without the knowledge of his principal. Further, in illustration of the want of due attention to this important object, I may mention that, owing to the chimney of the stove and of the vestry fire-place terminating above the belfry and in the open vault of the spire, the ringers on more than one occasion have been sufferers from the noxious gases descending on them, which could hardly fail of happening in a calm state of the atmosphere.

In alluding to the want of precaution as regards obtaining artificial warmth by fires, the remark is of very wide application; and owing, undoubtedly, to ignorance as much as to carelessness. Patent fuel is advertised, fit, as vaunted, for use in stoves, in passages and rooms without chimneys, as if the carbonic acid gas produced were respirable and innocent; and it is no doubt bought and employed with that belief. How often do we hear of lives sacrificed from burning charcoal in huts and tents! It was one of the many causes in operation last winter in the destruction of life amongst our troops before Sebastopol, which ordinary care and science should have excluded.

It may perhaps be said, that such fatal accidents are few in comparison with the use made of charcoal fires. That is true; because, where such fires are most used, as in the East, the wooden houses are nowise air-tight, and consequently allow a degree of ventilation, preventing accumulation of the noxious airs. Moreover, in the East, the charcoal fire is

never brought into a room till the coal has been well ignited, and it has ceased, as it may be inferred, to produce carbonic oxide.

In conclusion, let me remark, if such morbid effects as I have described, endangering life, can take place in a church so capacious as that of Ambleside, and holding at the time less than one-half its full complement of people, how much greater must be the risk, when a like mode of heating is employed in smaller, more confined, and crowded buildings, whether public or private.

Lesketh How, Ambleside, Jan. 12, 1856.

ON THE DISEASES OF THE COLLIERY OPERATIVES IN A PART OF SOUTH LANCASHIRE, AND THEIR PREVENTIBLE CAUSES.

By WILLIAM I. COX, M.R.C.S.

THE mission of the modern, the true physician, is as much to prevent as to cure disease. Prophylaxis is as great a testimony of skill and scientific research as therapeia; whilst it affords a surer evidence of that disinterested and Christian philanthropy, which should characterise the professors of the noble calling of physic.

No medical practitioner resident for any length of time in the midst of a mining or manufacturing district, can fail to remark and to deplore (provided he be possessed of the requisite powers of observation and of the ordinary feelings of humanity) the vast amount of evils in the life of the industrial classes, and the large proportion of disease springing from causes associated with their daily life, toils, and habits, which, if not altogether removable, might at least be lessened and mitigated by judicious measures.

Holding the appointment of medical officer to an extensive colliery in the vicinity of Wigan, I have had and still have ample opportunities of observing the principal maladies affecting colliery operatives, of tracing their predisposing and exciting causes, and of trying to estimate to what extent these are removable. I propose then, in a very condensed form, to consider *seriatim*—

1. The DISEASES* of colliery operatives:

* It is scarcely necessary to remark, that in this little essay I shall not treat of any of the *accidents* frequently occurring in coal-mines (explosions from gases, etc.), nor of their disastrous results.

2. The CAUSES of such diseases: and
3. REMEDIAL OR PREVENTIVE MEASURES.

1. DISEASES. *a. Pulmonary* diseases. Bronchitis (acute and chronic), asthma (vesicular emphysema), and tubercular phthisis are very prevalent. Chronic bronchitis, often complicated or associated with emphysematous lungs and enlargement of the right cavities of the heart, is perhaps the most frequent chest affection. Asthma (I merely wish to indicate by this much abused term the more or less permanent dyspnœa, consequent on various pathological states of the pulmonary tissue and pleural cavity) is so common, as to be designated by some writers the "scourge of the coal mine." Tubercular deposit and its effects are very frequently met with amongst colliers. The local irritation of the pulmonary tissue, excited by the almost perpetual inhalation of coal-dust, etc., contributes much towards the developement of phthisis; by awakening into fatal activity the dormant seeds of disease, and by favoring local congestion around the air-cells, as well as by inducing bronchial spasm and its secondary results. That peculiar morbid condition of lung, known as *spurious melanosis*, or *anthracosis*, but which might with more propriety of nomenclature be termed black or *carbonaceous infiltration*, is frequently discovered in the few and scattered autopsies which the ignorance and prejudices of this class of the community permit us to make. The "black spit" is the popular cognomen of the chief sign of this disease during life. This remarkable pathological phenomenon was first noticed by Pearson, was ably described by Laennec in 1806, and subsequently by Dr. William Thomson (*Med.-Chirurg. Trans.*). Whether, as suggested by Dr. Watson, the carbonaceous matter acts injuriously *only* on those who are already, by heritage or otherwise, unsound in the lungs or prone to pulmonary consumption, may be regarded as still a matter of uncertainty. I think it highly probable that such is the case. *Sed lis adhuc sub judice est.* It seems, however, an ascertained fact, that when the deposit has proceeded to any considerable extent, it acts as a foreign body; irritating the delicate tissue, and, of course, hastening the developement of disease.

β. Pleuritis, acute and chronic, with its ordinary results, hydrothorax and empyema, is of frequent occurrence. The men and boys employed at the "brow", as it is termed, *i.e.*, in the open air at or near the pit's mouth, are sufferers in greater proportion from these affections than the pitmen themselves. It is not difficult to explain this. They are

equally liable to the inhalation of coal-dust and of mephitic vapours from the pit-fires, and are, moreover, exposed to wet and cold and all vicissitudes of weather.

γ. *Heart* disease, in its various forms and pathological phases, is very common, and is, I believe, on the increase amongst the miners. Pericarditis and endocarditis are frequently seen, associated with attacks of acute rheumatism; valvular lesions naturally follow, as the distressing results of repeated attacks of these maladies. Hypertrophy (especially of the right ventricle) and thickening of the free borders of the semilunar valves, both aortic and pulmonary (probably from what have been termed vegetations or granulations), are among the most frequent pathological conditions.

δ. *Fibrous* and *synovial rheumatisms* are by no means unfrequent; the former leading to the structural cardiac lesions already referred to, and ultimately to death by asthenia or dyspnœa; the latter to stiff and contracted joints. The former is of most frequent occurrence. Muscular rheumatism also in its various forms, particularly lumbago, is very common.

ε. *Renal* disease, chiefly morbus Brightii or albuminuria, is not rare. Sometimes it would seem to date from the mechanical injuries to the back and loins, to which miners are necessarily very subject: and still more frequently it appears to be in some measure induced by long persistence in the unnatural and irksome position which these men are compelled, under certain circumstances, to assume during labour; crouching down, doubled up, as it were, in a low-roofed chamber, yet obliged to exert considerable muscular effort in this posture. It is not surprising from this, that the kidneys should ultimately suffer. Most commonly, however, the renal mischief is associated with hypertrophied heart, and doubtless might be traced to a common cause—habitual intemperance. Of course, all these exciting causes may be conjointly in operation.

ζ. *Cutaneous* diseases, such as have for their especial exciting cause want of cleanliness, are often present—*prurigo, scabies*, and *impetigo*, are the most frequent visitants.

On the whole, pulmonary and cardiac diseases have most victims.

2. Causes. The remediable or mitigable causes of the diseases above enumerated are as follow, and may be imperfectly classed as,—A, primary or exciting causes; and B, secondary or predisponent causes.

A. *a*. *Perpetual neglect of personal cleanliness*, as regards

removal of cutaneous filth, etc., so that the due function of the skin is in constant abeyance. This neglect is carried to an almost incredible extent.

b. Habitual intemperance in the use of alcoholic liquors. Drunkenness, according to recent statistics, is more rife in the colliery districts of South Lancashire, than in any other part of England. In the immediate district wherein these observations are chiefly made, the prevalence and extent of this destructive vice is truly appalling. The township of Hindley, in the borough of Wigan, containing, according to the last census, a population of 7,800, has fifty-two houses for the sale of beer, whereof eleven are also licensed for spirits.

c. Entire neglect of the most obvious precautions against the effects of the great vicissitudes of temperature to which the pitmen are exposed, in going to and from the scene of their labours; the workings of the mine having, of course, a nearly uniform temperature, independent of the weather or seasons.

B. *a. Want of proper ventilation* in the dwellings of the operatives, and the consequent respiration of impure and vitiated air.

b. Deficient water supply. In this district, which, as stated above, contains between seven thousand and eight thousand souls, and also in the adjoining township of Abram, there may be said to be no water-supply at all. The town of Hindley itself is dependent for all water-supply on some five or six semi-public pumps, and about as many open wells (dry in summer). I had nearly forgotten, however, to mention the resources of a filthy and polluted stream, running through the centre of the town, of which many of the poorer class of inhabitants avail themselves. The supply in the more rural district of Abram is equally inadequate. Foul stagnant pools, and wells few and far between, are the only sources. Need I say that dirt, and its attendant profligacy, reign supreme in this neglected locality?

c. Absence of education. A very small portion only of those employed in the coal-mines can read or write. From statistics which I have myself collected, and also from other trustworthy sources, I find that among the colliers in this district, one only in four can read, and that but one in six is able both to read and write.

d. The gross immorality which prevails among the colliery operatives. Unbounded licentiousness in the intercourse between the sexes, which scorns every restraint of

morals or decency, is so common, that it is rare indeed to find a wife who has not been a mother previous to her marriage, and that, too, whilst yet in her teens. Concubinage and unrestrained conversation are the order of the day. The indecent and demoralising practice of the employment of women at the " brow", dressed in male attire, no doubt contributes much towards this deplorable social state. But, be the cause what it may, no observer of human nature can question or underrate the vast influence which such a condition must exert over the *habits* of the individual, or its reaction upon his or her physical welfare. Self-respect being lost, personal negligence and indifference to bodily decorum and to the healthful condition of dwellings soon follow; aversion to cleanliness, and love of wallowing in filth and in physical and moral pollution, is soon engendered. The habitual infringement of the *moral* law becomes, in short, directly and indirectly a prolific source of *bodily* disease and ruin.

e. Entire absence of intellectual converse and associations for mental or moral progress. But little idea of enjoyment is entertained, save that suggested by a degraded sensualism. No public social meetings, no scientific association, no mechanics' institute (at least in this locality), offer any antidote to the beershop, or any attraction in lieu of the glass of ale.

f. Lastly, I may be allowed to mention, a sad want of harmony with other classes of men. It is notoriously a fact, that colliers live almost apart from society. They are a class *per se*, and have little sympathy with their fellowmen employed in other pursuits.

Hindley in Wigan, Lancashire, Feb. 1856.

(*To be continued.*)

SANITARY REFORM IN RELATION TO SOCIAL AND MORAL DEVELOPMENT.

By BENJAMIN DANIEL, M.R.C.S.

If the aphorism, that the proper study of mankind is man, be true in a general sense, how much more is it applicable to those whose proper duty it is to investigate the causes of his diseases, to trace them to their consequences, and more or less to obviate or modify their injurious influences. Such a study resolves itself into an acquaintance with the natural constitution of man, and with the nature of those circumstances by

which he is encompassed; how far he is subject to them, and how far he has the capability of controlling them. Without such a comprehensive view, it would seem somewhat presumptuous to interfere with the delicate mechanism by which natural functions (whether in health or disease) are performed; and a careful consideration of the quality of the organ, and that of the remedial agent, with an accurate experience of their mutual relations, can alone form an established basis for the foundation of sanitary science. At a time like the present, when social questions occupy so much of men's minds, much assistance may be given in forwarding their solution, by a due appreciation of the connexion which exists between physical requirements and moral development. It is not enough to regard the subject of our study simply anatomically, as so many nerves, so many arteries, so many bones and muscles, arranged so and so; or chemically to look upon him as a laboratory for the composition or decomposition of elementary bodies; or as composed of so much sulphur, so much phosphorus, so much lime. Nor will it do to limit our observations to the structural changes which take place under the normal or morbid influence of organic life. It is necessary that we also take into consideration his constitution as a moral and intelligent being. In the earlier stages of society, when manners were more simple and diseases more rare, the profession of medicine was combined with that of the priest; and Celsus tells us that in his days health had degenerated, and a complicated system of medicine had become necessary, on account of the effects of sloth and luxury upon the Romans; and that all the means of art were unavailable to counteract those evil results. I believe it to be capable of demonstration, that neglect of the physical requirements of the body is followed or accompanied by moral delinquency; and I believe, also, that these two conditions react upon each other, and that, by their reciprocal and combined influences, human nature might become so degraded, as to justify the Mephistophelian observation, that "the only use mankind makes of his reason, is to make himself more exquisitely animal than any other living creature". It is a bounden duty to probe the nature of existing evils, in order that remedies should be found. It may be more convenient, and add more to our complacency, to ignore the existence of unpleasant subjects; but it is not always safe to do so. We are told that "the turning away of the simple shall slay them, and the prosperity of fools shall destroy them."

Whatever may be the moral and religious requirements of man, he has qualities, in common with all animal nature, which imperiously demand gratification. Hunger and thirst will be satisfied at all risks; and wolfish ferocity has been observed under their influence. It is a radical error to suppose that, as a general rule, one can neglect the body, and at the same time develope the intellect and elevate the soul. We are not endowed with passions, with inclinations, or antipathies, that they should go for nothing, or be artificially destroyed, and that we should become, like the Stoics, simply intellectual and mechanical; nor does religion teach us to neglect those things which are necessary for the body, whilst we pay exclusive attention to those which are requisite for the soul. A code of sanitary laws in relation to religion and to society exists in the Pentateuch; and it is a subject of careful reflection how far they were adapted to the regeneration of a people which had become demoralised and servile under the influence of oppression. According to profane writers, and the internal evidence of the sacred records, the Jews were subject to leprosy; and in Leviticus xiv, 35, etc., minute regulations are given for the prevention of the spread of that disease. When the leprosy had localised itself in any particular dwelling, it was to be eradicated by cleansing and whitewashing, which, if ineffectual, was to be followed by the destruction of the unhealthy dwelling house. Leprosy appears to have been a disease of a very malignant character, according to the stringent regulations which were enacted for its eradication. The symptoms are also described with minute accuracy, to enable the priest to form a correct diagnosis.

Tacitus, remarking on the subject of the Exodus observes, "Very many historians agree, that a hideous pestilence having broken out in Egypt, king Bocchoris, eager to obtain a remedy, consulted the oracle of Hammon, which commanded him to purify the land by expelling into other countries that people (the Israelites), which was hateful to the gods. They were therefore gathered from all parts, and being driven into a dreary desert, and breaking out into despair and lamentations, Moses alone of all the exiles exhorted them not to expect any assistance either from the gods or from men, as they had been deserted by both, but only to trust themselves to him as a celestial leader by whose aid they had already conquered their present miseries. They assented, and commenced in perfect ignorance their planless march." Cleanliness is impressed in almost every page of the Levitical code, constant washings and bathings are commanded after

contact with any sort of uncleanness, — whether it consisted in contact with the sick, or with dead bodies, or with unclean beasts, or from any personal pollution of any description. Cleanliness was made an article of religion second only to godliness. Personal purity of the body amounted almost to sanctification, and was made emblematical of purity of soul. To avoid the accumulation of filth in the camp, it was ordered, "Thou shalt have a place also without the camp, whither thou shalt go forth abroad. And thou shalt have a paddle upon thy weapon; and it shall be when thou wilt ease thyself abroad thou shalt dig therewith, and shalt turn back and cover that which cometh from thee." Restrictions in the nature of the material of which their clothing was to be composed,* and restrictions in the nature of food, were institutions adapted to curb extravagance in dress and diet. In the latter particular it would seem that the chosen people, in their passage through the desert, were almost incorrigible. They continually rebelled, fearing hunger and thirst. Manna was sent to appease them. They even got tired of this heaven-sent food; it became insipid to them, and they craved for something more savoury; for we read that "They wept again and said, there is nothing at all but this manna before our eyes," and they longed for "the cucumbers and the melons, and the leeks and the onions and the garlic." To punish them quails were sent, on which they feasted, and in consequence suffered from the visitation of a plague.

The nature of an eastern climate renders a particular attention to the requirements of the body imperative, the action of the skin being so much more vigorous in those regions. Disorders of the stomach, liver, and bowels are also frequent, and are liable to be caused by improper or excessive diet. It is hence common to most orientals to observe religious restrictions in their food. The Brahmins adopt the vegetarian system, and Goldsmith addresses them with, "Hail, O ye simple honest Brahmins of the East, ye inoffensive friends of all that were born to happiness as well as you. You never sought a short-lived pleasure from the miseries of other creatures, you never studied the tormenting arts of ingenious refinement, you never surfeited upon a guilty meal." It is said that the ancient Syrians and Egyptians did not eat fish, and that the ancient Greeks also avoided it from superstitious motives; that the Egyptians of Thebes

* Deut. xxii, 11.

did not eat sheep out of respect to their god "Hammon," whom they worshipped in the shape of a ram. It is remarkable that many of the traditionary customs of the modern Jews, are recorded by Herodotus as the particular manners of the Egyptians: thus he says, "that no Egyptian man or woman will kiss a Grecian on the mouth, or use the knife, spit, or cauldron of a Greek, or touch of the flesh of a pure ox that has been divided by a Grecian knife." "That the Egyptians were circumcised for the sake of cleanliness, thinking it better to be clean than handsome." (Euterpe ii, § 47.) They considered the pig an abomination; and if by accident an Egyptian should touch one only with his garment, "he forthwith goes to the river and plunges in." In regard to their habits of cleanliness, and their notions of the causes of disease and the means of preventing it, he observes, "that they dressed themselves in linen garments, which were constantly well washed," that "they purged themselves every month three days successively, seeking to preserve health by emetics and clysters; for they supposed that all diseases to which men are subject proceed from the food they use." The priests went so far as to shave their whole body every third day, that neither lice nor any impurity might be found upon them. When engaged upon the service of the gods, they washed themselves in cold water twice every day and twice every night. Some colour is lent to the necessity of these extreme precautions by the letters we receive from the East. The stench of a Turkish camp is recorded as something appalling; whilst, in the camp before Sebastopol, the animated nature to be seen on a soldier's under-garment has been said to lie as thick as the small print of a newspaper.

How far sumptuary laws are capable of moderating luxury in diet or in costume is very doubtful. To eat turbot and to dress in silk was at one time the prerogative of princes, whilst now it is the prerogative of those who can afford it; and we find that, as a general rule, the very prohibition acts as a stimulant to the appetite, and gives a relish to that which otherwise would be uncared for. Whatever practical examples the great ones of the earth afford, are quickly taken up by the people who follow in their wake. *Quidquid principes faciunt, præcipere videntur.*

In the matter of diet, the ages that can be said to equal our own in the ingenuity of their *cuisine*, and the variety of *mets* and *entremets*, appear to be, that which called forth the laws of Lycurgus for the reform of the Spartans, and that

which obtained in the time of Nero, in Rome. According to all historic accounts at such periods, men seem to have justified Shakespeare's conclusion :—

> "What is a man
> If his chief good and market of his time
> Be but to sleep and feed? A beast, no more."

At the time that Lycurgus made his laws, Plutarch tells us that even then, 800 or 900 A.C., social evils were rampant, luxury and pride possessed the rich, misery and want, with its concomitant debasement, was the lot of the poor; therefore, to prevent hoarding of wealth, he banished the precious metals, and made iron the current coin of the realm. To check gluttony he established public eating-houses, where men met to a wholesome repast, composed of the monthly contributions of each member, which consisted of a bushel of wheat, eight gallons of wine, five pounds of cheese, two pounds and a half of figs for dessert, and a little money to buy fish and flesh; thus, in substantial nutriment, the Spartan fare was not wanting. A good appetite was considered the best sauce, and as all eating in private was strictly prohibited, the guests arrived at table tolerably hungry. A certain king of Pontus, having heard "black broth" much spoken of, sent for a Lacedemonian cook on purpose that he might have the privilege of tasting the genuine production, which, however, not coming up to his expectations, he hesitated not to discover his dislike; which induced the uncourteous cook to reply, that to make the broth relish, his Majesty would have required to bathe himself first in the river Eurotas. Plutarch states that "gormandising previously prevailed to such an extent, that the butchers and cooks used to cram the people in private, as they did the beasts and poultry they fed on. By this way of life their manners had become not only corrupted, but their bodies too were enfeebled, so that giving the rein to their sensual appetites, they stood in need of long sleep and hot baths; and, in a word, of as much care as if they were continually sick." Descriptions of a parallel state of society are to be found in Seneca's *Epistles*, and in Petronius Arbiter. The first expresses his opinions thus (epistle 21st): "Simple meats are out of fashion, and all are collected into one; so that the cook does the office of the stomach, nay, and of the teeth too, for the meat looks as if it were chewed beforehand": that "from these compounded dishes, arise compounded diseases, which require compounded medicines." He draws his inferences thus: "From hence come paleness, nervousness, and worse

effects from indigestion than from a famine, weakness of the joints, the abdomen enlarged, suffusion of bile, torpor of nerves, and palpitation of the heart, with other diseases that are but the punishment of luxury." It was a reproach to Seneca, that he did not practise what he preached; but that is a failing very common amongst many who know what they ought to do, but do not choose to do it. "To say and do not", has been a practice from the earliest times; still, there was more sincerity about Seneca, than is to be found in Scribes and Pharisees in general. He was a man of the world, and he makes his confession (*Of a Happy Life*, cap. xv): "If I do not live as I preach, take notice, that I do not speak of myself, but of virtue; nor am I so much offended with other men's vices as I am with my own." Many moral and religious teachers of the present day are not half so candid. Dr. Johnson speaks of the courage of the adventurous experimentalist who first ate an oyster; and had he known how *patés de foie gras* were produced, he would not less have admired the science of modern cookery. A gross sensualism prevailed in Nero's day, and displayed itself in magnificent and *recherché* dinners. In a bill of fare may be observed these delicacies: a dish of grilled snails served up on a silver gridiron; dormice and blackbirds baked in a pie; hogs roasted whole, and filled with sausages and stuffed meats; the hinder paps of a sow which had only farrowed the day before; iced wines; and muscadine of a hundred years old.

In the present day, it is of some importance to trace what connexion there may exist between the social physical condition, and that restless longing for change or excitement which at the present time is more or less observed throughout the world. Nothing is more certain than that neglect of the essential conditions of health commonly reacts upon the moral system, begetting impatience, irritability, and want of self-control. An indigestion will make a wonderful difference in the look of the external world. An attack of gout is generally preceded, and frequently accompanied, by a most cynical spirit and irascibility. Jaundice is usually connected with the greatest despondency. A bilious look is commonly regarded as the feature of melancholy or discontent. Good assimilative powers make men contented and good humoured, friends of order and respectability. Thus Cæsar asks:—

> "Let me have men about me that are fat,
> Sleek-headed men and such as sleep o' nights;
> Yond' Cassius has a lean and hungry look:
> He thinks too much."

It is certainly true that physical discomfort begets an unquiet, peevish spirit. Children, suffering from chronic disorders of the bowels, become worn and haggard, and are most fretful, wayward, and uncontrollable. The reason why many people dread *ennui* as much as real pain, is that they are subject to an irritable, impatient, and restless spirit, combined with a body wanting physical stamina—a state of things which can only be remedied by a simpler manner of life. The popular remedy in such cases makes the case worse, as it is generally sought to be obviated by stronger and stronger doses of excitement. Under the influence of a temporary fit of the bile, a man will brood over his real or imaginary wrongs, until the phantasm assumes a reality too powerful for reason to withstand. It will assist the sufferer, to reflect that a physical cause is at the bottom of this moral disturbance:—

> "The yellow bile that in your bosom floats,
> Engenders all these melancholy thoughts."

And if an uncomfortable sensation cannot be reasoned away, it is encouraging to know that it is only of a temporary character. The stern, unbending constitution of a man's temper, may be temporarily aggravated by constipation of the bowels; and though it may appear a paradox, yet instances of the administration of justice, under such circumstances, have assumed the character of a wrong. Bichat, with some reason, has endeavoured to locate the seat of the emotions in the thoracic and abdominal viscera, and it is not without a foundation on the common practice of mankind; for the hand is carried to the head to indicate thought, but the expression of feeling and truth is ever shown by putting it upon the breast. In scriptural phraseology, to express the emotion of affection, it is said of Joseph that "his bowels did yearn upon his brother."

There is no question of the fact, that the occupations of modern civilised life are not such as to render the greatest amount of moral or physical well being. Sedentary occupations, by precluding the possibility of fresh air and exercise, generate a languid circulation, and a torpor of the general system; and during the hours of relaxation, which are generally in the evening, recreation is more frequently sought in the theatre, the concert room, and in the tavern, than in the quiet and comfortable contemplation which a well balanced constitution is able to draw from more intellectual pursuits. Every medical man has had occasion to remark how the soul may be bowed down under temporary bodily disorder, and to observe mental depressions which

no intellectual strength can dominate; to hear sensations described, which hang like a millstone round the neck, making life itself a burthen which, but for religious principles, might gladly be laid down. Is it, then, to be wondered at, that to escape from such moral depression, some exciting distraction is eagerly sought after? Pleasure is less often sought for itself, than as a means of killing time.

Dr. Waller Lewis, having been commissioned by the Government, has sent in a report of the laws and ordonnances in France for the regulation of noxious trades and occupations. He speaks thus of the influences operating in manufacturing towns: "The population of the manufacturing towns are weak and diminutive; bent over the looms, and living in shade, they become etiolated like plants. Since the great increase of the manufactures in the department of the Haut Rhin (from 1810 to 1823), the average height of the people has not increased in the same proportion as in the neighbouring departments. Official documents prove that the population of the manufacturing towns is less vigorous than that of the rural districts. Everything tends to exhaust it: placed as auxiliaries by the side of the devouring activity of steam, or a fall of water which never reposes, it carries to its utmost limits the development of its forces; in the large assemblage of all ages and sexes, the passions are lighted up, the contagion of vice acts with a kind of furor, and the excesses of debauchery accelerate the deterioration of the strongest constitutions. In this manner the sources of reproduction become impoverished and corrupt; conceived in misery and libertinage, the weak scions of this bastardised population pass in their turns under the empire of the same causes of physical and moral degradation; it is, in fact, a circle without end, in which health and life go on exhausting themselves continually."

After such a statement, can it be doubted that the justice of inflicting punishment should be even questioned, when vice is fostered by the very institutions which develope material prosperity? No wonder that a knowledge of such influences acting upon the social system should make men cast about for a remedy. The establishment of reformatory schools has suggested itself, and, if properly carried out, may do some good. When it is stated that the moral bears a direct relation to the physical state (that is, taken as a general rule), it is not to be looked upon as an hypothetical supposition, but as a matter of the commonest observation, and is founded on the authority of reports to the Government, made by commissioners who state that, after thorough investiga-

tions, the result is invariable, that when food is dear, or when work is scarce, the moral thermometer falls, and committals for crime increase. Disease also shows itself in the shape of fever and dysentery; and the greater the privations, the greater the mortality. On the other hand, when necessaries are cheaper, and occupation brisker, an immediate fall of the number of committals and diseases is the direct result. It requires more than a vulgar philosophy to enable those who happen not to possess the necessaries of life, to maintain, under such unfavourable circumstances, an equable and virtuous mind. It is very well known, that the cause of the late French Revolution was not a simple question of a change of dynasty or of form of government, so much as it was an outburst of general discontent. St. James asks—"From whence come wars and rumours of wars among you? Come they not hence, even of your lusts that war in your members?" If, therefore, it can be shown that the influence of physical causes on the moral constitution is excited for good or for evil, and that power of selection is granted to us, it follows that the condition of society is dependent upon the wisdom which takes into consideration the full significance and importance of our natural requirements, and avails itself of so important an auxiliary of moral improvement. The laws of our physical nature cannot be abused or neglected with impunity; sooner or later they vindicate themselves, and the debt must be paid. It is advisable not to run up too long a score, or the reckoning may be more than we calculate.

NURSERY GOVERNMENT IN ITS SANITARY ASPECTS.

By T. HERBERT BARKER, M.D., F.R.C.S.

Among all the physical evils now occupying the attention of men who devote their studies to the question of Public Health, there can be none more important than the excessive mortality of infants which marks our present stage of civilisation. When we read—not in the coloured statements of a declamatory writer, but in the Report of the Registrar-General*—that, in the space of seven years, in the city of Manchester alone, "thirteen thousand three hundred and sixty-two children perished, over and above the mortality

* For the year 1849.

natural to mankind", we feel compelled to investigate the causes of such an enormous sacrifice of infant life. Some of these causes are doubtless peculiar to that dense centre of our manufacturing population; but that there are other and more general causes, not confined to any particular localities, but everywhere contributing to swell the sum of infant mortality, will be clearly shown by the following tables of graveyard statistics.

In order that we may see in their true significance the facts of the case, it is proper to observe, in the first place, that our infantile population is entirely free from many of the evils which cause excessive mortality among adults. Intemperance, dissipation, over-work and anxiety, the fatal accidents so frequent in several perilous occupations—these, and many other causes of a preternatural ratio of adult mortality, must be entirely left out of our calculations on the annual sacrifice of infant life. In other words, according to the ratio by which these causes make an *increase* of adult mortality, they should show a *decrease* in the mortality of infants. But our tables will show that the special causes of mortality in infancy and childhood are either so numerous or so potent, that they are found sufficient, not only to counterbalance the considerable sum of circumstances favourable to infant lives, but also to raise their average mortality far above that of adults! These remarks may serve to explain the assertion, that the *proportion* of deaths in infancy to those in adult age is, when all circumstances are considered, even greater than the following tables show! For if A. ought to have been a gainer to the amount of four, but finds himself a loser to the amount of four, it follows that he has lost eight. Just so, these tables show that our infant population *loses* more lives within the first five years, than our adult population, in any subsequent average period of five years, in the ratio of nearly twelve to one; but it must also be considered, that it ought to have *gained* by the exemptions and advantages to which we have alluded. Consequently, the value of these exemptions must be *added* to the sum of excessive infantine mortality, in order to give the total loss.

The total disproportionate mortality of infancy has never been exhibited in a strict statistical form. Yet the following Tables, compiled from the returns of a strictly rural district (Bedford), from the General Reports for England and Wales, and from the returns of various continental states, shew that we have ample grounds for a suspicion that serious errors are prevalent in the management of infancy.

TABLE I.

Number of Deaths at different ages in Bedford during sixteen years, from 1837 to 1853.

Sex.	6 months.	1 year.	2 years.	3 years.	4 years.	5 years.	5 to 25 years.	25 to 45 years.	45 to 65 years.	65 to 85 years.	85 to 100 years.	Total.	Deaths under 5 years in 1000 at all ages.
Males	398	202	90	48	37	65	327	373	351	348	17	2256	372
Females	284	184	101	44	35	57	380	375	352	388	23	2223	317
Totals	682	386	191	92	72	122	707	748	703	736	40	4479	345

TABLE II.

Number of Deaths at various ages in fourteen rural parishes near Bedford, during sixteen years, from 1837 to 1853.

Sex.	6 months.	1 year.	2 years.	3 years.	4 years.	5 years.	5 to 25 years.	25 to 45 years.	45 to 65 years.	65 to 85 years.	85 to 100 years.	Total.	Deaths under 5 years in 1000 at all ages.
Males	334	149	60	25	19	44	174	118	154	267	17	1361	464
Females	235	120	64	28	29	57	336	197	214	265	12	1557	335
Totals	569	269	124	53	48	101	510	315	368	532	29	2918	399

TABLE III.

Number of Deaths in Infancy and Childhood, as compared with the Number of Deaths occurring at all ages, in England and Wales.

Date.	Under 1 year.	From 1 to 5 years.	From 5 to 10 years.	All other ages.	Totals.	Deaths under 5 yrs. in 1000 at all ages.
1838	73,606	58,531	16,138	194,485	342,760	385
1839	74,531	62,166	16,715	185,566	338,978	403
1840	77,411	67,909	20,207	194,360	359,687	404
1841	74,210	59,373	17,868	192,396	343,847	388
1842	78,704	60,331	17,208	193,276	349,519	397
1843	79,253	58,370	16,142	192,680	346,445	397
1844	80,086	59,918	17,371	199,558	356,933	392
1845	77,426	58,151	15,852	197,397	349,366	388
1846	93,644	66,976	16,190	213,605	390,315	411
1847	88,508	69,863	19,120	242,175	419,666	379
Total	797,379	621,588	172,811	2,005,498	3,597,516	394

TABLE IV.

Number of Deaths in Infancy and Childhood, as compared with the Number of Deaths at all ages, in various Continental States.

Country.	Date of statistics.	Under 1 year.	From 1 to 5 years.	From 5 to 10 years.	All other ages.	Totals.	Deaths under 5 years in 1000 at all ages.
France	Average 1817-31	176,708	108,609	37,312	361,900	784,529	363
Prussia	1839-41	103,509	74,937	19,443	197,914	399,136	447
Sweden	1806-35	15,540	8,513	2,583	39,939	66,576	361
Norway	1801-35	birth to 10 years		7,867	13,326	21,193	371
Russia	1825-27	bth.to 5	314,969	38,035	251,456	604,461	521
Austria	1834-39	209,866	1 to 4 yrs. 80,830	..	350,388	650,084	461
Saxony	1832-41	16,746	1 to 6 yrs. 6,447	..	23,227	46,420	499
Frankfort-on-the-Maine .	1840-42	bth.to 5 yrs.	357	25	754	1,136	314

A glance at these tables will suffice to show the very large relative mortality in infancy and childhood. It is well known that children are remarkably susceptible to all the injurious agents which tend to shorten life, and when such agents exist in full force, the mortality in early life becomes excessive. In Manchester, for instance, it is calculated that one-half of all the children die before they reach the age of five years. In healthy country districts the infantile mortality is much less. Of a thousand born in agricultural districts, two hundred and twenty-one will die under five years of age, showing a mortality less by half than that of Man-

chester. One-fourth of all the children born in England die before they reach their fifth birthday,—

"An unripe harvest for the scythe of death."

Here is the strongest possible argument for sanitary improvement, and for the diffusion among the mothers of England, of correct principles relating to the management of infancy and childhood.

The question next arises—what are the causes of this excessive mortality? They may be found under the following general divisions:—*First.* Original constitutional debility, or hereditary disease. *Secondly.* Acute diseases, such as measles, hooping-cough, scarlet fever, etc. *Thirdly.* Our general want of sanitary measures, giving rise to pollution of the atmosphere. *Fourthly.* Mismanagement with regard to diet and regimen in the nursery.

Of these four causes of mortality, the first three are common to all ages: the last alone is peculiar to infancy. The first is doubtless an item of some importance. Of the second it is to be observed, that the amount of infant mortality resulting from acute diseases might be greatly diminished by such a course of nursery government as would invigorate the constitutions of children. This is obvious. Every nurse knows that measles, or hooping-cough, proves fatal to the delicate child, but passes almost harmlessly by the robust. Respecting the third general cause I will remark, that the want of efficient sanitary measures, which presses so heavily on the health of the entire population, must obviously be especially injurious to the delicate frame of infancy; so much so that, as a general rule, we might take infantile mortality as a criterion of the sanitary condition of a neighbourhood. Thus, in some of the worst parts of London, one may find wretched men and women who, when questioned on their own health, will reply that they are "well" (though that is not true); but ask the women "where are their children," and one may probably extort such facts as that "one has only a solitary child left out of *seven*," and "*another has buried thirteen!*"*

But making a full allowance for the operation of these general causes, there must still be left a heavy balance of infant mortality to be ascribed, chiefly or solely, to mismanagement in the nursery.

To this last cause of infantile mortality I shall exclusively devote attention in the following articles. The rea-

---

* GODWIN's London Shadows, p. 76.

son for thus giving it the priority is, that I regard it as surely and easily preventible; and the object is, to point out the two simple means of its prevention:—(1.) An increased attention to the subject on the part of medical men; (2.) Sound instructions for mothers and nurses. On the first of these preventive means I may venture to give a hint to my professional brethren; but my chief purpose is to assist in popularising the instructions that should be imparted to every mother and every nurse of children.

If we would diminish the excessive mortality of infancy, and prevent the numerous cases of physical misery in adults resulting from mismanagement *in the nursery*, we must not only popularise sound instruction of mothers and nurses, but must also urge the necessity for a greater degree of attention to the subject on the part of medical men, both lecturers and practitioners. The topics belonging to infantile hygiene should, it is conceived, form no inconsiderable part of every course of lectures on midwifery and diseases of children. Unfortunately, these topics, seeming so simple and easy that few will take the pains to study them, are, too often, passed over lightly and briefly. And what is the consequence? The young practitioner fresh from the schools, who has carefully studied the anatomy of the human body; who has studiously followed the surgeon round the wards of the hospital, and has constantly attended the operating theatre; who prides himself on his dexterity in amputating a limb in a few seconds, and waits impatiently for his first hernia operation—this practitioner, so far well educated, may, after all his studies, be puzzled when required to prescribe the best course of diet for a newly-born babe deprived of its natural source of nutriment! The medical man who could save life even in a rare case of surgical difficulty, may sacrifice the life of a healthy infant for want of knowledge of a few plain natural laws of diet and regimen!* Surely, here is an inconsistency

---

* We append one example of almost ludicrous mismanagement, which was happily corrected before it could reach a fatal crisis. After a lady's confinement, it was found advisable to use an embrocation to relieve difficulty of lactation. The precaution of washing the breast before attempting to suckle the infant was neglected! Very naturally, the infant, disgusted by the strong-smelling oils, refused to take the breast. This led to a second mistake—the determination to bring up the child by hand; and this was carried into effect in almost the worst possible way. The stomach was crammed with thick pap; cries of distress were mistaken for calls of hunger; and soon all the sufferings of infantile dyspepsia followed. When three months old, the child had wasted away to a mere skeleton, and weighed less than at its birth! At this stage it was rescued from mismanagement, and soon began to thrive.

that ought to be removed, as speedily as possible, from our plan of studies.

A well educated medical man should be prepared for any case that *may* occur in the course of his practice; but especially for cases that *must* demand his notice almost every day. It is requisite that he should know the remedy for a case of poisoning by aconite, and be able to treat successfully a compound fracture of the thigh-bone; but, in rural practice, years may pass away without a call for his aid in such cases, while he can scarcely pass through a village without finding some example of infancy suffering under mismanagement. It may seem, to an undisciplined mind, something low and beneath the dignity of the profession to give advice on the preparation of food for a babe,—to furnish recipes for such nursery dishes as panada, *crême de pain*, *lait de poule;* but it remains true that on such apparent trifles depend results far greater than those of many brilliant operations in surgery. Compare them. After the best exercise of skill in restoring to use the fractured limb in an adult or aged patient, what has been done? Probably ease and comfort have been secured for a few remaining years of life, and this is no slight boon. But by rescuing an infant from fatal mismanagement, a whole life—perhaps a long life—of vigour and physical happiness may be insured. To young students of medicine who are tempted to overlook homely and everyday duties, while exploring the subtleties of theory or rare cases in practice, we would commend the philosophy inculcated by Milton:—

> "Not to know at large of things remote
> From use, obscure and subtle, but *to know*
> *That which before us lies in daily life,*
> *Is the prime wisdom.*"

In the NURSERY, our attention to a few simple rules of diet and regimen may secure that basis of physical happiness, a vigorous constitution; or our errors may inflict injuries for which the utmost resources of medical science can supply no remedy. And so closely are mind and body united in this life, that even the moral character of the man may be affected by errors in the physical treatment of the infant. I might cite painful examples to support this assertion; but it may suffice here to refer to one—the abuse of alcoholic stimulants, sometimes administered to children by ignorant nurses. Of this more may be said in another place.

(To be continued.)

THE FIRST FOOD OF INFANCY.

By FREDERICK J. BROWN, M.D.

One means of improving the human species consists in substituting good cow's milk for the breast-milk, in all cases in which there is ill health on the part of the mother, or when an hereditary predisposition to disease exists. Children brought up by hand suffer from thrush, and pine away, in many instances; but this is the consequence of their being fed with biscuit, gruel, and other articles.

If cow's milk be mixed with a small proportion of water or barley-water, and white sugar, and if it be then gently warmed and introduced into a suck-bottle, it will be readily taken by an infant, both by day and by night. Nothing else is required until the child arrives at the age of three or four months, when it may be fed with plainly boiled or scalded white bread, with a small quantity of white sugar, in addition to the cow's milk given by the suck-bottle. Children, when thus brought up, thrive and escape disorder of the digestion. I am acquainted with a family that is afflicted, both hereditarily and personally, with scrofula, gout, spinal curvature, and insanity. There were eight children. The youngest two are dead. All were suckled by the mother, excepting the fifth; and that one is strikingly different, both in mental powers and physical conformation, from the rest of the family. He is tall, straight, and strong, and is possessed of good abilities. So much for cow's milk *versus* tainted breast-milk.

Where the mother is free from both hereditary predisposition and actual disease, and when she is sufficiently strong to perform the function, there can be no doubt that child-suckling is desirable. It accords with the natural maternal instinct, and it serves the wise purpose of increasing the attachment that exists between the mother and her offspring; and it may, possibly, communicate to the child some of the mother's qualities, as well mental as physical.

The normal duration of lactation is a subject that claims attention. It would be well to ascertain what it is in the mammalia throughout the series. Some principle common to the class will probably be discovered, namely:—

Duration of lactation in some ratio with utero-gestation; or in proportion to the condition of the masticatory apparatus; or in relation with the capability of the young animal to provide for its own sustenance.

Whilst these inquiries are going forward, it is advisable to adopt some rule in practice. The following is the rule recommended for general adoption :—Nine months to bear the child, and nine months to suckle it.

This rule should be earnestly impressed upon the maternal mind. Women are continually applying for advice for dyspeptic and nervous disorders that result most markedly from over-suckling. Succeeding children must be weakened in constitution by the injury to the mother's health induced by over-suckling. In no case should the mother suckle beyond nine months ; and when symptoms of super lactation manifest themselves at an earlier period than nine months, no matter how early the period, the mother should abandon suckling.

Lactation should be desisted from whenever the catamenia appear ; no matter how soon, excepting only the first after parturition, which is natural. The system cannot support with impunity the concurrence of these two secretions.

One word as to weaning : there is no necessity to disgust the child with the mother's breast. Give it the suck-bottle and withhold the breast. The mother may use purgatives to relieve the breasts. The child may suck the bottle as long as it pleases. This method of weaning removes from the mother's mind the idea of harshness.

It is to be hoped that no woman will ruin her own health and weaken the constitution of her future offspring under the idea of escaping from conception during lactation. Conception rarely occurs during the normal period of lactation, but it is not prevented by a prolongation of the period. In those cases in which pregnancy occurs during the early months of lactation, there should be the immediate abandonment of suckling. All women should practise this rule.

Chatham, Kent, March 1856.

[We have placed the useful papers of Drs. Barker and Brown side by side, because it is at once instructive, and confirmatory of truth, to find two independent observers taking such sound and common-sense views on one of the most important, though most neglected, subjects connected with sanitary science. The views maintained by these gentlemen will be readily accepted by the profession ; but it is to the public generally that such teachings most forcibly appeal. EDITOR.]

THE DICTIONARY OF FOODS AND DRINKS;

A COMPENDIUM OF ALIMENTARY SUBSTANCES IN USE THROUGHOUT THE WORLD: THEIR HISTORIES, DIETETIC PROPERTIES, AND ADULTERATIONS.

PART IV.

ALKANET (*Anchusa tinctoria*), a plant of the natural order, *Boraginaceæ*. It is used to give a yellow colour to some foods, as butter. See *Alkanet*, under *Adulterants*.

ALLSPICE. A West-Indian spice, the fruit of the *Eugenia pimento*, natural order *Caryophyllaceæ*. It is an aromatic, and is used commonly to give a flavour to foods. Owing to its cheapness, this spice is not commonly adulterated. But it is used as an adulterant in France in the formation of the spurious pepper-corns, called Lyons pepper. Allspice is a harmless substance as an article of food. Allspice owes its aroma to a volatile oil, which may be distilled from the berries, and is sometimes used in medicine.

ALLIGATOR PEAR, the fruit of the *Persea gratissima*. The tree is a native of the West Indies. The pear often weighs upwards of a pound. The part eaten, and which is a delicious food, is a buff butyraceous substance, lying beneath the rind. It has nutritious properties.

ALMOND, the fruit of the *Amygdalus communis*, natural order *Rosaceæ*. The tree grows in the south of Europe, in Spain, Barbary, Syria, Sicily and Greece. There are two varieties of almond fruit, bitter and sweet. The sweet almond is largest in size, and sweet; the bitter almond is smaller and bitter, and gives off an odour, communicating a peculiar sensation at the back of the throat. This taste is due to a specific principle in the bitter almond, called amygdalin. From this substance an essential oil is obtained, which is sold in the shops as oil of bitter almonds, and which ordinarily contains from 8 to 14 per cent. of prussic acid. The flavour bestowed on articles of food by the bitter almond, or its oil, is due in most part to the acid above named; although, according to Dr. D. Maclagan, it is sometimes free from this deleterious substance. As a medicine, the bitter almond is most useful when properly administered; but its use for dietetic purposes, and by ignorant persons, is most reprehensible, since dangerous effects must and do occasionally arise from its employment; moreover, the bitter almond, as an article of diet, is quite unnecessary, and is only used for the absurd purpose of gratifying the taste

The sweet almond furnishes an useful oil, which is not dan-

gerous; and the fruit itself is eaten at dessert, and is pleasant and wholesome. The almond should always be blanched before being eaten, as the husk sometimes gives rise to intestinal irritation and eruption on the skin. When the sweet almond is bleached, pounded, and mixed with water, an emulsion is formed, which is useful as an adjunct to some medicines. Oil of sweet almonds has been considered nutritive, and has laxative properties. It is, however, not much used, either as an article of diet or as a medicine.

The sweet and bitter almonds, with their oils, were known as foods to the ancients, under the name of the "Greek or Thasian nuts." It was believed that they conferred on those who took them the power of drinking immoderately; and the followers of Apicius mixed together almonds pounded, honey, eggs, oil, milk, garum, and pepper, and made thus a dish which was considered a great delicacy.

ALOE. The broken leaves of the aloe are prepared and used occasionally in the adulteration of tea. See *Adulterants*, art. *Aloe*. The properties of the aloe are medicinal only.

ALUM (*Sulphate of Alumina and Potass*). A crystalline salt, found naturally in Italy, in alum shale. Alum is largely used as an adulterant. See *Adulterants*, art. *Alum*.

AMBROSIA (*α* not, and *βροτος* mortal). The food of the gods, supposed to convey immortality on all those who ate of it; hence the name. It flowed, says the fable, from the horns of the goat Amalthæa, and was nine times sweeter than honey.

AMANITA, the Siberian intoxicating fungus (*Amanita muscaria*), a vegetable of the natural order *Fungaceæ*. This fungus resembles the common mushroom, and is a native of Kamschatka. It is collected, according to Professor Johnstone and other authorities, in the hot months, and is dried, or is left to ripen and dry. When steeped in the expressed juice of the whortleberry, the fungus gives up a principle which possesses intoxicating properties. But a common practice is, to roll the fungus up into a bolus, and thus swallow it. One or two fungi, thus taken, will produce an intoxicating effect which will last from six to twelve hours. If water be taken at the same time, the symptoms are very much increased. The physiological action of the fungus is remarkable: in some persons it acts like laughing-gas; sometimes it causes spasmodic attacks. Another peculiarity is, that the intoxicating agent passes off freely by the kidneys, and imparts to the renal secretion intoxicating powers; and

it is a fact supported by the testimony of all who have visited Kamschatka, that the renal secretion, thus acted on, is taken as a stimulating and intoxicating beverage.

AMARANTHUS, a plant of the natural order *Amarantaceæ*. Some species of amaranthus are used as spinach. They are insipid (*Lindley*). The amaranth flowers in autumn, and grows in the south of England.

AMILOT, a Mexican white fish. This fish is a choice article of diet; it measures a foot in length. It is caught in rivers and lakes.

AMMODYTE, the sand-eel, an animal of the class *Pisces*, order *Malacopterygii apoda* (Cuvier). The sand-eel is caught by digging into the sand at low water. It is common on the sandy shores of Britain, and forms a delicious article of food.

AMYLUM. The technical term for starch. See *Starch*.

ANCHOVY (*Engraulis*), class *Pisces*, order *Malacopterygii abdominales* (Cuvier). A fish common in the Mediterranean and on the coasts of Portugal, Spain, and France. It is also said to have been taken on the coasts of Britain. Its length is from four to five inches. The fishermen of the Mediterranean remove the heads and entrails of these fishes, wash them in salt water, and pack them with salt. The fishermen of Provençe colour the salt with ochre, and do not change the brine. The fishermen of the north use only bay-salt, and change the brine several times, which renders their anchovies less acrid. (Soyer.) Anchovies, preserved in one or other of these ways, are imported under the name of Gorgona anchovies, Sicilian, Dutch, etc. They are brought to this country in barrels, and are bottled after importation. Anchovies are nutritious and pleasant articles of diet. In their native regions they are eaten fried, but in this country only in their preserved state. They are commonly used in salads, or to flavour sauces, etc. Sometimes they are fried in paste, sometimes eaten with toasted bread. Anchovies are subject to adulterations. An inferior species of anchovy, having no flavour, is imported from Holland. The anchovy is frequently coloured—commonly after being brought into this country—with Venetian red and Armenian bole, the former of which sometimes contains lead; hence the fish should always be well washed before it is eaten.

ANCHOVY PASTE. A potted meat, prepared from anchovies. It is a pleasant, and when pure, a wholesome article of food. It is frequently adulterated, both with inferior

species of anchovy and sometimes with other kinds of fish, and even ordinary meats. It is commonly coloured with Venetian red and Armenian bole. The natural colour of the paste is a pale pink; and its flavour in this pure state is best. Flour, chalk and plaster of Paris are also adulterations.

Anchovy Pear. A fruit common to Jamaica, used by the natives as an article of food.

Anchovy Sauce. A condiment prepared by pounding anchovies in a mortar, warming them with a small quantity of water, adding Cayenne pepper, and straining through a hair sieve. The sauce is adulterated for the sake of colour with Venetian red or Armenian bole, both of which impair the flavour, and are otherwise objectionable.

ANGELICA, the garden angelica, a plant of the natural order *Umbelliferæ*. It grows in England in watery places, flowering from June to September. It is used occasionally as a herb in broths, as a vegetable flavouring substance. The root and fruit have been used in medicine.

ANISE, the *Pimpinella anisum*, a plant of the natural order *Umbelliferæ*. The seed of the plant is used in foods and also as medicine, to give an aromatic flavour. In food the seed is generally added to cakes. The seed yields about three per cent. of a volatile transparent oil, upon which the sweetness and aroma depend. Hemlock seed has sometimes been sold by mistake for anise-seed, and fatal results have followed: the peculiar odour of the anise is its best test. *Anise-seed* is a harmless and pleasant adjunct to foods, *Anise-oil* is an agreeable aromatic; both are used to flavour liquors, as aquardiente, aniseed gin, and the like.

APPLE, the fruit of the *Pyrus Malus*, a tree of the natural order *Rosaceæ*, sub-order *Pomeæ*. Apples are mentioned at an early period of history, as forming an article of food in the East and in Greece; and the tree was carefully cultivated by the Romans, who are said to have introduced it into France. It is also said, with much probability, that the apple is a native of Britain; its aboriginal form being the wild crab-apple, a small, dry, sour, unpalatable fruit. By a careful system of propagation, aided no doubt by a blending with the varieties originally brought from the East and from Southern Europe, some thousands of varieties have been produced, all of which are more or less nutritious and wholesome. The subjoined information regarding this well-known fruit is supplied by Mr. J. H. Tucker.

The importance of apples as food has not hitherto been

sufficiently estimated nor understood in this country. Besides contributing a large quantity of sugar, mucilage, albumen, and other nutritious matter, they contain a combination of vegetable acids, extractive matter, and aromatic principles, with the nutritive matter, as to act powerfully as refrigerants, tonics, and antiseptics; and, when freely used in times of scarcity by rural labourers and others, they prevent debility, strengthen digestion, correct the putrefaction of nitrogenous food, avert scurvy, and probably maintain and strengthen the powers of productive labour. The operatives of Cornwall consider apples nearly as nourishing as bread, and more so than potatoes. In scarcity, apples, instead of being converted into cider, have been in that county sold to the poor; and the labourers have asserted that they could work on boiled apples without meat, whereas a potatoe diet required either meat or fish. The French and Germans use apples extensively; indeed, it is rare that they sit down in the rural districts without having them in some shape, even at the best tables. The labourers and mechanics depend on them to a very great extent, and frequently dine on sliced apples with bread. In some other countries, however, apples are less appreciated; in Belgium, the use of them was forbidden by the authorities on the advent of cholera in 1854.

Apples are used as food in various forms. For the most part, those in which the amount of acid is moderate, while the saccharine or aromatic principles predominate, are eaten in the raw state. The unripe fruit, or those containing a large quantity of acid, as well as some of the milder tasted varieties, are formed into various articles of cookery, by being stewed, roasted, or made into puddings, etc. Mr. Tucker informs us, that "stewed with rice, red cabbage, carrots, or by themselves, with a little sugar and milk, they make a pleasant and nutritious dish." Apples have been given as food to cows, with the effect of causing them to produce a more abundant and richer milk than they had hitherto done. The apple is largely cultivated in England, principally in the counties of Somerset, Devon, and Hereford, and also in France and North America, for the purpose of obtaining from it the well known beverage termed cider. For this purpose the more acid varieties are chiefly employed. In Normandy, we learn from Professor Johnstone, not fewer than five thousand varieties are cultivated for this purpose; and it is remarked, that the apples there produce a cider of different flavour, according as they grow on chalk, sandy, or clay soils.

SANITARY AND SOCIAL SCIENCE.

REPORTS OF CITIES, TOWNS, & DISTRICTS.

REPORT ON THE SANITARY STATE OF THE TOWN OF DUDLEY.

By J. H. HOUGHTON, Esq., M.R.C.S., Officer of Health.

The town of Dudley, the principal and centre of that numerous group of towns which are situated in the populous and important district known as the South Staffordshire Coal-field, is itself built in the county of Worcester, on the very edge of the county: the castle and castle grounds, which adjoin the town, and form one of the most interesting objects in the district, being situated in the county of Stafford.

A chain of hills, elevated far above all surrounding objects, runs in a direction very nearly from south-east to north-west from Rowley Regis to Sedgley Beacon through the parish. The south-eastern portion of this chain is formed by basaltic rocks thrown up by volcanic convulsion to a very considerable height; the north-western portion is formed by the Wenlock limestone of the Silurian system. The town itself is built on the spot where these two formations meet. The soil covering that part of the parish which lies on the limestone is very strong and clayey, whilst that which lies on the basalt is of a much lighter and more earthy nature. The substratum is formed of a deep bed of strong clay of great depth, quite impermeable, hence the place is cold and, except in seasons of excessive drought, damp.

The surface of the town itself is very undulating, and on the northern and southern sides of it the fall is great in every direction. From the town itself the parish extends principally to the south and west, and here are placed the populous and important hamlets of Netherton and Woodside, which together at the last census contained a population of 8,128 souls. These two hamlets are situated at a level very many feet below the level of the town.

It is computed that the range of hills now spoken of forms the highest inhabited ground in the kingdom; and their very great altitude is proved by the facts that no canal has been brought into or very near the town, in spite of its manufacturing importance, and that the tunnel which passes under the town, and by which the traffic is maintained between the

immense works situated on the northern and southern sides of the town, is at a level of 150 feet below the level of the town.

There is a curious fact worthy of mention in reference to the elevated position and drainage of Dudley, viz., that the rain and drainage from the houses on the eastern side of the High-street flows into the Trent and so into the German Ocean, whilst that from the houses on the western side flows into the Stour, and thence by the Severn into the St. George's Channel. The level of the town varies from 500 to 600 feet above the sea, though there are parts in the parish which rise to 1,000 feet.

The tower of the old castle stands on an eminence very many feet above, and commanding a complete view of the whole of the town and of the surrounding country; and it is probable that there are few spots in England from which a more glorious prospect can be obtained than from the top of the keep of Dudley castle. Within a range of ten miles twelve important towns, including Birmingham and Wolverhampton, can be seen; and in the farther distance the eye can range over an expanse of 120 miles in diameter, and reach into nine counties of England and Wales, embracing Malvern, Hatterill, the Wrekin, Bardell hill in Leicestershire, and many other places of less note.

The increase of the population of Dudley has been rapid. At the census in 1801 it amounted to 10,107 souls; in 1831 to 23,043; and in 1851 to 37,954 souls. From that time to the present, the excess of births over deaths has been 4,154, so that making due allowance for the migratory habits of some of the people, the population is now at least 42,116.

The majority of this population is employed in mining operations, in the smelting and manufacturing of iron in its various branches, and in the manufacture of glass. The wages obtained by the workmen are always high (except in times of great commercial depression), and in many cases would appear fabulous to persons not acquainted with the district. Hence a plentiful supply of all the necessaries of life, including animal food and beer, is within the reach of most people, except when their own follies or vices prevent a proper appropriation of the money earned.

In 1851 there were 7,337 houses in Dudley; hence, roughly speaking, there are about five and three-fourths persons to each house.

In a town of Dudley's great antiquity (for its origin is traced back so far as the Conquest) and recent and rapid

F 2

growth, a great diversity in the character of the houses will be naturally expected, and so we find it; some of the very oldest being wretched hovels unfit for human habitations; others of a more recent date being small, low, ill ventilated and ill contrived; and others, lately built, and specially since the plans have been under the inspection of the local board, being of a superior description.

The Metropolitan Association for improving the Dwellings of the Industrial Classes have lately established a branch in Dudley; have purchased an excellent piece of land and just completed a block of ten houses; and are contemplating an extension of their operations, by which it is to be hoped the dwellings of the working men will be still materially improved.

In the year 1851, an inquiry was instituted by the General Board of Health into the sanitary state of Dudley; and the result of that inquiry was embodied in an able and copious report by Mr. Lee, to which I am indebted for some of the facts in this article.

It will be obvious from the general description which I have given of the elevated position and undulating surface of the town and parish of Dudley and of the surrounding area, that it has natural sanitary advantages of a very high order; and that, with one drawback incidental to its elevation, viz., deficiency of water, it has every natural requisite for a good state of health and longevity; its undulating surface affording the greatest amount of natural drainage, and its great elevation exposing it most freely to the western and northern gales, and so creating every facility for unusual natural ventilation. The sequel will shew that but for these two great advantages, and most probably the high "*condition*" resulting from the great consumption of animal food and nutritious diet, the mortality of Dudley would have been unique in the history of sanitary science.

The report of Mr. Lee was based on statistical facts ranging over a period of ten years ending 1850. The facts are carefully tabulated, so as to contrast them with the facts accumulated from other sources, and in commenting on them, Mr. Lee observes: "In whatever respect these tables are compared, whether as to the mortality per 1,000 of the population, or the proportion of deaths of infants, or the proportion of deaths from epidemics, or the average age of all who have died, or the proportion of deaths at 1, 5, 15, or 20 years of age, it will be evident that the inhabitants of the more favoured districts live at least half as long again as the inhabitants of Dudley." Again, "in the more healthy districts,

about 16 per cent. of the deaths, or one-sixth of the whole, are those of children under one year of age, but in Dudley the proportion of those dying is about one-third of all the deaths on an average of 10 years. Under 15 years of age, the proportion in the more healthy districts is 29·4 per cent., in Dudley it is 67; under 20, the deaths in the more healthy districts are 32·9 per cent., but in Dudley it is 69·8 of the whole. In Dudley, therefore, it appears that about as large a proportion of the entire population dies in the first year of life as in the more healthy districts die under 20 years, and that in Dudley only 3 out of every 10 human beings born survive to years of maturity, whilst in districts containing more than 1,000,000 population about two-thirds of all born grow up and become men and women. The accidents in the mines, which it is often alleged are sufficient to account for the high rate of mortality, increase it only from 26·24 in the 1,000 to 26·97; whilst the deaths from epidemics, which are the most preventible of all diseases, increase the mortality from 20·67 per 1,000 to 26·97 of all living. In the more healthy districts the average duration of life is 41 years, whilst in Dudley it is only 18 years and 4 months, or less than one half." The average duration of life for the whole kingdom is 29 years; for London, 29 years; for Bristol, 29 years and 3 months; and for Sunderland and Newcastle-on-Tyne, both mining districts, it is 24. Mr. Lee sums up by saying that "*in no town in England is the work of extermination of human life so successfully carried on as in Dudley.*"

TABLE

Showing the number of deaths, and their causes, for each quarter in the years ending September 1854 *and* 1855.

Disease and Age.	Quarters ending 1853-4.					Quarters ending 1854-5.				
	Dec.	Mar.	June.	Sept.	Total	Dec.	Mar.	June.	Sept.	Total
Fever: under 15......	22	12	11	10	55	11	5	5	10	31
„ over 15	9	6	2	1	18	7	10	6	5	28
Scarlet fever: under 15	84	36	15	13	148	10	6	3	1	20
„ over 15 .	1	1	—	—	2	—	—	—	—	—
Measles: under 15....	—	9	19	6	34	13	—	—	7	20
„ over 15	—	—	—	1	1	—	—	—	—	—
Diarrhœa: under 15 ..	23	21	18	34	96	33	14	7	11	65
„ over 15....	6	2	1	9	18	10	6	1	7	24
Cholera: under 15	—	—	—	—	—	28	1	—	—	29
„ over 15	—	—	—	—	—	29	4	—	—	33
Hooping cough: und. 15	—	7	1	—	8	—	—	—	—	—
Other causes: under 15	148	178	106	117	549	123	213	111	74	521
„ over 15 .	99	113	84	75	371	101	171	88	93	453
Total	392	385	257	266	1300	365	430	221	208	1224

I forbear to comment on facts so striking, lest in doing so I should weaken the force of them; but I rather proceed to develope the causes of this sad state of things.

The hasty sketch which I have given of the situation and contour of the spot on which Dudley is built and of the country which surrounds it, together with the fact that there is not any trade carried on in the place injurious to health, but on the contrary, that the occupations of the people are rather conducive to health, from their being carried on in the open air or nearly so, from their giving full development to the system, and from their affording wages sufficient to command a supply of good animal food, would lead, *primâ facie*, to a very different conclusion to that which statistics detail. In the absence, then, of natural causes, or of causes arising from occupation, we must look to causes of " man's creation"; in other words, to causes arising from breach of sanitary laws, and in them we shall find an ample explanation of the evils.

Up to July 1852, when the Public Health Act was first applied to Dudley, it may be said that the town and parish of Dudley were absolutely destitute of any sanitary care, sanitary powers, or sanitary knowledge, and a very strong impression generally prevailed that Dudley was an unusually healthy place, an impression which the unanswerable facts brought out by Mr. Lee, which facts have been amply corroborated by those which it has been my duty to bring forward, have failed to eradicate from the minds of some persons of considerable general intelligence, and some of great wealth and influence; but though there has been a good deal of criticism and mere assertion, there has not been any attempt to meet facts by facts, or to give any explanation of the facts consistent with the views of those who affect to disbelieve them.

I have not any records by which we may judge of the relative preponderance of each zymotic disease over a period of years, but the annexed table will show it for the two years ending September 1855. It will be observed that the table has been prepared simply to show the grand division between preventible and non-preventible disease, with the former of which at present we are alone concerned. Under the head of " other causes" are included marasmus, tabes, and infantile convulsions, each of which, I am very much disposed to believe, is practically as preventible as fever or cholera. A large number of deaths arise from these three causes in Dudley; in the year ending September 1855, one hundred and two deaths were registered from infantile con-

vulsions alone, or exactly one in twelve of the whole deaths. The aspect of the table would be sadly changed if the deaths so caused were taken from "other causes" and added to the list above.

An examination of the table at once shows, that in the year ending September 1854, there were 380 deaths from zymotic diseases and 920 from other causes, the proportion being 1 zymotic death to 2·421 of other deaths. In the year ending September 1855, the zymotic deaths were 250, and the deaths from other causes 974; being in the proportion of 1 to 3·896. In the two years, the zymotic deaths were 630, and the deaths from other causes 1,844; the proportions being as 1 to 3·006. Of the total of these zymotic deaths, 506 were under, and 124 over, fifteen years of age; the proportions of deaths under fifteen being to those over fifteen years, in the ratio of 4·08 to 1.

The cholera alone caused a greater proportion of deaths in adults than it did in children. It will also be seen, that the mortality for two years from each preventible disease stands in the following order:

	Persons.
Diarrhœa in the two years carried off	203
Scarlet fever	170
Fever (in its extended sense)	132
Cholera	62
Measles	55
Hooping cough	8

There has been also a gradual but persistent decrease of zymotic deaths in every quarter for the last two years (except the cholera quarter); which happy result is attributable, I believe, partly to the proper sanitary supervision of the town which commenced then, and partly to a general decrease of zymotic diseases.

There is one most important fact shown in the table, which must not escape observation; viz., that in the year preceding that in which the cholera appeared in Dudley, the number of deaths from zymotic diseases was greater than in the year in which the cholera prevailed, in the proportion of 1·520 to 1, or rather over 50 per cent.; affording additional proof that cholera is always preceded by a great excess of zymotic diseases, and leading one almost to believe that there is some influence pervading nature, which, like a thunderstorm, goes on increasing in intensity as it proceeds, developing first fever and diarrhœa, and then cholera; after which it seems to have exhausted itself, and to have left us free from zymotic influences for a time. The fact also proves that we have less

to fear in reality from the much dreaded cholera, than we have from fever and diarrhœa; and shows the absolute absurdity of sanitary activity only when its approach is expected, and sanitary apathy and indifference whilst fever is quietly but surely doing its work of destruction; in fact, it proves that sanitary vigilance should be unceasing.

After the ordinary zymotic diseases, and probably before them in point of number of persons attacked, come the diseases of the digestive organs, which the records of the dispensary prove to be very numerous. It will be remembered that the late Dr. Prout was of opinion that many of these diseases were of a malarious origin.

I may just allude here to the great prevalence of stone in Dudley, and the South Staffordshire Coal-field generally. Five operations for lithotomy have taken place within the last six months, in the practice of the Dudley Dispensary.

In endeavouring to develope the causes of the defective sanitary condition of Dudley, I will speak of—1. Drainage; 2. Water supply; 3. Hill-side houses; 4. Privy accommodation; 5. Pigs; 6. Overcrowding.

1. *Drainage.* The drainage of the town divides itself into the underground and surface. In speaking of the underground drainage, it is necessary to premise that my observations refer only to the parishes of St. Thomas and St. Edmond, containing together a population of 22,236 souls; the other three parishes of St. Andrew, St. James, and St. John, containing at the last census a population of 15,718 persons, being destitute of any attempt whatever at artificial drainage.

The remarks on the underground drainage will be easily summed up. The total length of roads in Dudley parish is thirty-six miles; of which twelve miles are turnpike roads, seven miles town streets; and the aggregate of all the public sewers little more than one mile in length. The evidence of Mr. Bateman, the town surveyor, given in 1851, goes to prove that most of these were nearly filled; and consequently, as Mr. Lee observes, "it may fairly be pronounced that Dudley is in a worse position than if no underground drainage existed." It is satisfactory to be able to state that the remedy for this great evil is close at hand. Admirable plans of the parish have been made by Mr. H. C. Roper, and approved by the General Board of Health. The sections are now in progress; and it is expected that the contracts for the new drainage will be out this spring.

The superficial drainage of some parts of the town is tolerably good; but there have sprung up within the last

few years, in Dudley, hamlets, containing an aggregate of about ten thousand souls, in which there has not been any attempt whatever at the formation of roads, or of even superficial drainage. The streets have been laid out by the proprietors, without any controlling power, the traffic, which has been absolutely necessary, has been carried on over the deep clay, and so the surface has been thrown into every shape; here a pool of water, there a hillock; the refuse from the houses, animal and vegetable, with the excrements of the children, is constantly thrown into them, and lie festering on the surface, and the emanations from them, when the summer's sun is causing the evaporation of the moisture, may be conceived. The Local Board are at present engaged in endeavouring to find a remedy for this glaring evil, which, however, is one of very great difficulty, from the magnitude of the evil, and the great expense which the remedy must necessarily cause, whether *that* fall on the Board or on the owners of the property.

2. *Water Supply*. The state of the water supply will be best illustrated by an appeal to statistics, and to a few other facts which have passed under my observation. At the last census, the parish contained 7,337 houses; and by a return made by the manager of the Water Works Company, in the same year, it appears that 1,800 houses only are supplied with water by the Company, or 1 in 4·761 of the whole; but the Company's pipes are not carried into St. John's or St. Andrew's parishes at all, so that in these two parishes there was then 2,548 houses, containing 13,172 persons, destitute of water, so far as the Company is concerned, and this number has been greatly increased in the last five years by the immense increase of building which has taken place in St. John's district.

At the time referred to, the Company, in dry weather, had not half enough water for the supply of those houses to which their pipes were laid; and I have myself, *whilst living in the High Street, the principal street in the town, been compelled to go out without having my gig washed, because there was not water to wash it with. I have begged water for domestic use from my neighbours, and returned the compliment to them when I had an opportunity.*

My sole supply was from the Company, and the water was then laid on only every second, and sometimes every third day. What the condition of the poor (who had not the use of the pipes) was, must be imagined.

Since that time, the operations and resources of the Com-

pany have been very materially extended, and now the supply to their customers is plentiful, and tolerably good.

Besides the Water Works, the town has not any source of supply but the rain water and ordinary pumps, and the latter, in consequence of the mining operations, are an uncertain source of supply. In the three districts to which the pipes are conveyed, the proportion of houses supplied to those not supplied by the Company is 1 to 2·660; but it is certain that the majority of the houses supplied are inhabited by persons who can well afford to pay for it; hence the supply to the poor must necessarily be, as we find it by experience, very limited.

(*To be continued.*)

SANITARY CONDITION OF PADDINGTON.

The parish of Paddington, situated at the western extremity of the metropolis, is bounded on the north-west by the open country, on the south by Kensington Gardens and Hyde Park, on the north-east by the parish of Marylebone and Notting Hill. It possesses many advantages, receiving from the west an atmosphere fresh from the country. The parish is divided in the Registrar-General's division into two sub-districts, St. Mary's lying to the north, St. John's lying to the south. By the late act, it is divided into four wards. Its superficial area is 1277 acres, its proportional area to that of the whole metropolis being as 1 to 61·81.

The Geological Nature of the superficial strata upon which Paddington is built varies. To the east of a line drawn from the canal bridge at Maida Hill to the head of the Serpentine, the soil on the surface is a mixture of gravel and sand. To the west of this line, the surface soil is a stiff clay of the London basin, with the exception of a portion of Kensington Gardens lying within the parish, and a small portion extending from hence across to the Uxbridge Road. These parts are gravel and sand.

The Mean Elevation of Paddington above Trinity high water mark is seventy-six feet, only four other parishes in London being higher, viz., Hampstead, Marylebone, Islington, and St. Pancras. The mean elevation of the sub-districts varies, that of St. Mary's being eighty-two feet, that of St. John's seventy-six.

Drainage. A small portion of the parish (a part of Kensal New Town) is drained into the Counter's Creek sewer, which discharges into the Thames on the south-east side of

Cremorne Gardens. The remaining sewers run into the common trunk, the Ranelagh sewer, which, commencing at Kilburn bridge, runs in a southerly direction through the parish, and discharges into the Thames on the south-east side of Chelsea Hospital. It has several branches, the chief of which commences in Grove End Road, extending thence by Lisson Grove, New Road, Grand Junction Road, and Albion Street, to a tumbling bay, where it joins the main sewer in Uxbridge Road. There is reason to believe that the calibre of this channel is not at all times sufficient to carry freely off the body of water which rushes through it.

The Water Supply of Paddington is from the Grand Junction Company, which now has its works above Hampton. This water is, we believe, identical in character with that of the West Middlesex, of which we gave an analysis in our last number. It is, taking it all in all, a good water.

Houses and Streets. The sub-district of St. Mary's contained, in 1851, 2557 houses, that of St. John's 4184. The new houses built in St. Mary's have in many cases been of an inferior class, and liable to epidemic visitations. The open spaces of the parish are numerous, the streets wide, and there are many squares. The surface of ground covered by open water is considerable—an objectionable sanitary arrangement. The average annual value of houses was £64 in the year 1851. In several streets, the houses are small, ill ventilated, closely packed, and inefficiently drained. The mortality of these streets is high.

Population. The population in 1851 was 46,305, giving an increase of 21,132 for the preceding ten years. The rate of increase was greatest in St. Mary's. By the same ratio of increase, the total is possibly now 54,000. Compared with a uniform distribution of the London population, there is in St. Mary's, Paddington, 1 person to every 242 square yards, and in St. John's 1 to every 75 square yards.

Burial-grounds. There are two graveyards within or close to the limits of the parish. Both are closed.

Mortality. The average annual death rate for a period of seven years, viz., from 1848-1854, was about 18·65 per 1000, being much below that of most other London districts. The highest mortality in the Paddington sub-districts, when compared with population, is in St. Mary's, being in this one 21·24 per 1000, while in St. John's it was 17·16. Deaths from epidemic causes are highest in St. Mary's. The deaths in seven years were, in St. Mary's, from all causes 2591, from epidemics 495; in St. John's, from all causes 3511,

from epidemics 649. The streets in which deaths from epidemic causes are most marked, are, in St. John's—Star Street, Market Street, Praed Street, South Wharf Road, Caroline Place, Stanley Street, Cambridge Place, Conduit Street, Union Place, Elmes Lane and Place, Brooke's Mews, Tichborne Street, Moscow Road, Polygon Mews, Sale Street, and Charles Mews; in St. Mary's—North Wharf Road, Hampden Street, Church Place, Brindley Street, Workhouse, Hall Park and Place, Pickering Place, White Lion Place, Kensal Road, Dudley Street, Welling's Place, and Waverly Road; these streets differ widely from each other. The North Wharf Road, where 39 deaths from epidemic diseases have occurred in the seven years, is situated on the north side of the canal basin, and its houses are low, ill-ventilated, and subjected to the effluvia from the stagnant water of the canal and the refuse lying near it. A similar condition obtains in South Wharf Road. In Star and Market Streets, where the mortality is highest of all from epidemics, there are a large number of dwellings with little space behind, and with ventilation exceedingly defective. Of the different epidemics during the seven years, scarlatina was most fatal, but typhus and other forms run high and are on the increase. Cholera destroyed 31 persons within the parish in 1849, and 77 in 1854. On both occasions the disease visited in many instances the same quarters of the parish, the greatest mortality occurring in Elmes Lane. Paddington holds a better sanitary position than many other metropolitan districts. But it admits of great improvement, and indicates, as yet, far too prominently the evils of low elevation, bad ventilation, indifferent drainage, and the other nursing mothers of disease and death.

The above facts are all abstracted from an excellent treatise bearing the title we have transcribed, by Dr. Graily Hewitt, to whom we offer public thanks for so useful an addition to sanitary literature.

MORTALITY OF THE PARISH OF CROYDON,

For the Years ending December 31*st, from* 1848 *to* 1855, *inclusive.*

It is very satisfactory to find generally, that a large proportion of the zymotic class of diseases are confined to districts without drainage or water supply,—including the northern and eastern portions of the parish, viz., part of Croydon Common, Norwood, and Shirley. The total number of deaths

in 1855 from all causes is 508, which is less by 112 than would have occurred at the average rate of mortality per annum for the last seven years, allowing for increase of population. The births for the year have been 364 females and 383 males; total, 747. The total number of houses in the parish is now 4,287. Of this number, there are in the special district, 3,296; and of these, supplied with water, 2,046; shewing still without water supply, 1,250; and probably 200 or 300 above that number in the special district unconnected with the drains. Notices for 178 new houses have been received and approved in the year 1855. The comparatively large number of houses for the year 1855, arises from the fact of their being taken from the rate books, and the new houses have not hitherto been included. For the same reason the vacant houses shew a like disproportion —all houses now in course of erection being included in that return.

POPULATION TABLE.

Year.	Population by Census.	Estimated Population.	Number of Houses.	Houses Vacant and Building.	Births for Year.		
					F.	M.	Total.
1841	16,712	„	„	„	„	„	„
1848	„	19,380	3060	280	262	260	522
1849	„	„	3107	283	290	297	587
1850	„	„	3171	170	298	267	565
1851	20,355	„	3234	175	291	312	603
1852	„	„	3345	201	287	331	618
1853	„	„	3622	177	368	347	715
1854	„	„	3721	258	233	374	707
1855	„	25,837	4287	344	364	383	747

The average mortality of Croydon, from all causes of disease and at all ages, for the seven years ending 1854, was 506 for the whole population, or 2·426 per cent. The number of deaths in the year 1855 was 508, or 1·975 per cent. The deaths at different ages, during the seven years abovenamed, gave the following average.

Date.	Under 2 years	2 to 10 years.	10 to 20 years.	20 to 40 years.	40 to 60 years.	60 to 80 years.	80 and upwards	Total.
7 yrs. end. 1854	119·6	93·2	39·3	73·1	68·6	86·1	25·3	506
For 1855......	137	57	33	72	80	101	28	508

The mean temperature of the seven years was 49·39; rainfall, 24 inches. The mean temperature of 1855 was 48·24; rainfall, 23 inches. In the seven years, among the causes of death, lung-diseases hold a high figure. Fever is at the head of the zymotic class, while deaths by accident

and suicide average 10 per year. The result of the above tables for the year 1855 is most satisfactory; for, although the per-centage is still higher than the Registrar General's standard for a healthy community, it may be considered a good return for so compound a parish; since, in addition to a very densely populated town district, there are in Croydon (besides other large establishments) the Central London District School, with an average of 1,050 children—shewing 27 deaths for the year; the Union house, with a weekly average of 213—shewing 49 deaths for the year; and Croydon barracks, with an average of 433 inmates—shewing 20 deaths for the year. Sixteen of 30 deaths from fever occurred in the undrained districts. There is a decrease in all diseases of the zymotic or endemic class, and an increase in those diseases only which are especially affected by the low average temperature of the year, and inimical to infancy and old age. (*Compiled from a report by* E. Westall, Esq.)

ALLOTMENTS FOR THE LABOURING POOR AT SOUTHAMPTON.

[Dr. Bullar, of Southampton, has kindly sent to the Journal of Public Health the following account of the principle of an allotment system at Southampton, abridged from a Report of the Allotment Committee.]

The Report itself is published in the hope that it may induce others, who live in large towns, to undertake the management of allotments for the labouring poor on a similar plan, which consists in a committee renting the ground, having it divided, and letting it as allotments under their regulations; not as an act of charity, but by hiring the land at its market price and charging the allottees sufficient to cover all expenses.

In country places, the allotment system has been carried out chiefly by the landowners themselves; but where there is no resident proprietor who is willing to take the trouble, as in large towns, the present plan will be found feasible, and of great benefit to the industry, comfort, and health of the labouring poor.

In consequence of the expressed wish of many labouring men for allotments, and the refusal of the owners of land to let any quantity to poor men who could not be responsible for a large sum, a Working Committee of three was formed.

The Committee hired a field of eighteen acres, and had it divided by a surveyor into 146 allotments of twenty rods each, or eight allotments to an acre, with convenient paths.

The first year (1850) the committee charged the allottees 6*d*. a rod, or 10*s*. an allotment, which was at the rate of £4 an acre.

In three years the bad debts amounted to only £8 : 13 : 0, and £222 : 3 : 0 was received, leaving a balance of £10 : 14 : 1 in hand after paying all expenses.

The committee cannot but think this statement will be acknowledged as most satisfactory, in regard to the payment of rent by so large a body of allottees taken indiscriminately in a large town where superintendence by the committee was out of the question; and that it shows the poor to be excellent tenants, when the rent is diligently looked after by a zealous and honest collector.

In 1852, the Rev. J. C. Wigram, Archdeacon of Winchester, was appointed Rector of St. Mary's parish, which contains 21,220 inhabitants, a large proportion of whom are of the labouring classes. From the experience of the committee, Archdeacon Wigram, with the full sanction and desire of the Bishop of Winchester, decided to let on the same plan twenty acres of glebe land conveniently contiguous to the houses of the poor. The same committee, with the Archdeacon as chairman, undertook the management, renting the land at the full price at which it had been let to market gardeners and graziers. It was partly arable and partly grass land separated by ditches, with the remains of an abandoned canal running through it, so that the committee were at a considerable expense in levelling, fencing, and draining it. It was next surveyed and divided into 162 allotments of twenty rods each (a few having more or less, according to the shape of the land), and with paths broad enough to admit small carts. The committee, besides paying all rates and other expenses, agreed to give £6 an acre for six acres, and £5 an acre for fourteen acres, the full market price of the land; and as they did not wish to make in any respect a charity, they found that they could not cover their expenses and risks at a less charge than 11*d*. a rod, or 18*s*. 4*d*. an allotment, except for a few allotments where the land was inferior, and which were charged at 9*d*. a rod. Eleven-pence a rod is at the rate of £7 : 6 : 8 an acre. In this instance the allottees were also taken indiscriminately as they applied, and were not restricted to parishioners.

At the end of three years £418 : 11 : 0 had been received.

The bad debts	in	1851-2	were	£3 : 13 : 8
,,	,,	1852-3	,,	£10 : 13 : 4
,,	,,	1853-4	,,	£2 : 15 : 0

that is only £17 : 2 : 0 in three years.

The committee have paid the collector at the rate of one shilling a year for each allotment. For this he takes the names of the applicants, procures their signatures to the cards, collects the rents, and attends the meetings of the committee when required.

The sanitary advantages of allotments to the poor of large towns must be very considerable. They have, as a rule, no available gardens, and cannot afford to buy in the market or of green-grocers that due supply of fresh vegetables which they require. These allotments furnish with fresh vegetables and with good potatoes 308 families; that is, above 1600 persons. To those engaged in sedentary occupations in close courts, alleys, and lanes, with no inducement for taking exercise, the cultivation of allotments at some little distance from their homes is most desirable, as it gives them the most efficient kind of exercise in the open air, with a good object.

There is another sanitary advantage in the allotments affording an immediate and useful outlet for manure from the pigsties and stables, and for the refuse of the houses of the poor. It is remarked that the allottees "farm high", and consequently make the most of that which is so much wasted in this country. Indeed, an allotment is often the poor man's bank, in which he invests much of his savings. The value of allotments is also great, inasmuch as they satisfy one of the strongest and most wholesome desires of the labouring poor—the wish to possess land and to cultivate it for themselves.

In this town there are numbers of working men, such as those employed in the docks in unloading ships, bricklayers, masons, painters, and common labourers, who are never fully employed; many will tell you that they are unemployed three, four, and even six months out of the twelve. To supply such with the means of profitable and healthy occupation, and such as they like, in their tedious compulsory leisure, which they would otherwise spend in idleness, or in frequenting beershops, is a service to them, morally as well as economically. Moreover, the working men in these parts expect and require this kind of assistance from those who are socially above them; they receive gratefully and value greatly such disinterested attempts to improve their condition.

MISCELLANEA.

PAUPERISM IN ENGLAND AND WALES.

On the 1st of January, 1855, 850,453 paupers received relief in England and Wales; and on the 1st of January of the present year, 876,655, out of a population calculated at 16,521,245, according to last census. This relief was distributed by six hundred and twenty-four unions. Of those relieved (in-door and out-door) on January 1st, 1855, 144,500, and on January 1st, 1856, 152,174 were able-bodied adults. On the day named in 1855, the in-door relief was supplied to 22,788 adult able-bodied persons of both sexes exclusive of vagrants; and out-door, to 121,712. On the same day 1856, in-door to 23,496, and out-door to 128,678. Amongst the relieved (in-door and out) on January 1st, 1856, 998 were married men, 1265 were married women, 164 were cases of urgent necessity, 18,526 were cases of sickness, 7579 were cases of sickness or accident of the family or for funerals, 4967 were on account of want of work, 25,595 were wives of adult males, 52,653 were widows, 5820 were single women without children, 3281 were mothers of illegitimates, 2182 were wives whose better (worse?) halves were in gaol, 2794 were wives of sailors, soldiers, or marines, and 5117 were wives of other non-resident males. The sum total of moneys expended in such relief for the half-year ending Michaelmas 1854 was £1,964,208; and for the same term ending Michaelmas 1855, £1,975,832. This expense was borne by 14,130 parishes. The expenditure, however, does not include parishes under Local Acts, Gilbert's Act, and the 43rd of Elizabeth, the total expenditure of which is stated at about £176,600.

In-maintenance consists of the cost of food and necessaries supplied in the workhouse: and in the six months ending Michaelmas 1855, it amounted to £466,490. Out-relief consists of relief in money or kind, or by way of loan to the outdoor poor, it amounted in the same term to £1,509,412. The increase of expense in the six months ending Michaelmas 1855, was £29,624 over that of the same period in 1854.

GRAIN AND FLOUR IMPORTED INTO IRELAND.

From the 1st day of January, 1855, to the 31st of Dec., 1855, there were imported into Ireland quantities of corn, grain,

meal and flour from foreign countries and British possessions, amounting to 992,771 quarters; and from Great Britain 782,252 quarters. During the same period, there were imported into Great Britain from Ireland, 1,964,655 quarters of oats and oatmeal, 171,030 quarters of wheat and wheat-flour, 58,078 quarters of barley and barley-flour, 24,648 quarters of beans and bean-meal, 4954 quarters of malt, and 61,363 quarters of other forms of grain or meal; making a gross importation from Ireland to Great Britain of 2,226,650 quarters of eatable stuffs. If the good times are not come to the Emerald Isle now, could she feed her neighbours at this rate?

HOMES FOR NEEDLEWOMEN.

It affords us great pleasure to be able to state that, through the benevolent exertions of the Viscountess Goderich and Lady Hartwell, a comfortable and respectable home for needlewomen has been established in Manchester Street, Manchester Square. The risk of the undertaking is, we believe, at present borne by these ladies. The house or home is presided over by a competent matron, is supplied with every convenience for cooking and sleeping, and with a capacious common sitting room. Medical attendance is kindly supplied by Dr. Edwards; and, by a strict economy, these advantages are brought within the limited means of the London sempstress, who is so fortunate as to have the opportunity of availing herself of them.

The precedent is excellent, and deserves an extended application in the metropolis. For this great purpose, however, organisation and concentration of purpose are required. The subject comes, indeed, within the sphere of municipal government; and that parish would be honoured that should produce a vestry knight, chivalrous enough to lead his colleagues to an earnest discussion on so important a point. He would be a *bonâ fide* legislator, too, such a man, not a mere talk forger; for he would strike at the root of a great social evil, and might confer immediate happiness, or comfort at least, on many hundred life-wearied innocents, who only become familiar with sin because they are wedded to it by misery. We shall watch the success of the undertaking of Ladies Goderich and Hartwell with great interest, with every desire to render such aid as it may be in our power to bestow, and with the hope that some of our influential readers may share in our devotion to so good a cause.

POISONOUS EFFECTS OF TURPENTINE VAPOUR.

M. Marchal de Calvi related to the Academy of Sciences in Paris, on December 10th, the case of a woman who had lived for some days in a newly painted room. The first symptom which she experienced was colic; but soon she became prostrated, her face was deadly pale, the eyes sunken, the lips could scarcely be moved, the breath was cold, the voice was lost, the limbs were cold, the pulse almost imperceptible, the countenance anxious; the intellect, however, remained perfect, and the patient felt as if she were about to die. Under the use of external and internal stimulants she rallied, but did not perfectly recover for a month.

Some experiments made by M. Marchal, in conjunction with M. Mialhe, tend to shew that the lead is fixed in paint, and that therefore the poisonous symptoms produced by fresh paint cannot be attributed to it. From other experiments, M. Marchal concludes that the vapour of turpentine produces poisonous effects on man and animals. The conclusions at which the author arrives are: 1. White lead is fixed in paint, and is in no way concerned in the production of the poisonous symptoms arising from inhabiting a newly painted room. 2. These symptoms are due to the vapour of turpentine. 3. The danger is the same, whether the base of the paint be lead or zinc. 4. There is danger of poisoning by the turpentine as long as the paint is not perfectly dry; and it is safest not to inhabit a newly painted room until all smell has disappeared. 5. Poisoning by turpentine enters into the same category as poisoning by the emanations from flowers. 6. The emanations from flowers act in two ways—idiosyncratically, or as poisons. 7. The action of turpentine is chiefly depressing. 8. Energetic stimuli constitute the proper treatment; the peristaltic action of the bowels should be excited by appropriate means. The last two conclusions are not absolute, not being founded on a sufficient number of observations. (*Gazette Médicale de Paris*, Dec. 29, 1855.)

POISONING BY SULPHURET OF CARBON AMONG WORKMEN IN INDIA-RUBBER MANUFACTORIES.

At the meeting of the Academy of Medicine on Jan. 15th, M. Delpech stated that he had arrived at the following conclusions with regard to the workmen in India-rubber manufactories.

1. That workmen in caoutchouc are liable to accidents which consist in (*a*) slight disturbance of digestion—loss of

appetite, nausea, vomiting, diarrhœa, and constipation: (*b*) disturbance of the intellectual functions—hebetude, loss of memory, extreme restlessness, and unaccountable violence; (*c*) more serious disturbance of the nervous functions—cephalalgia, vertigo, disturbance of sight and hearing, impotence, and various forms of paralysis. 2. That observations made on men and experiments on animals, who become affected in the same way, lead to the conclusion that these symptoms are to be attributed to the inhalation of the vapour of sulphuret of carbon. (*Gazette Médicale de Paris*, Jan. 19th, 1856.)

SANITARY APPLICATION OF CHARCOAL.

In a letter to the *Association Medical Journal*, Mr. G. M. Stansfeld suggests that square frames, made as light as possible, and covered with very fine wire netting, should be filled with *platinised charcoal*, and suspended at a convenient height from the ceiling in the wards of fever and general hospitals, or in the sick room in private houses.

The principle of suspension should be similar to the manner in which the punka is slung in Indian apartments; and by agitating the frames in a similar manner, most probably a more rapid decomposition and absorption of the impure air might be produced.

One, two, three, or more frames might be suspended, in proportion to the size of the ward; and a very simple contrivance would allow of their being moved to different positions in the apartments, as might be desired. The frames might be made of any size; but a medium size, framed as follows, would perhaps be best:—two slight frames, each three feet square, connected by four cross pieces, two inches long each; the intervening spaces to be filled in with fine wire netting, and the case then to be filled with small pieces of platinised charcoal. The frames should be suspended over the beds of the patients, and as low as possible, without being in the way of the attendants.

MORTALITY IN THE CITIES OF THE UNITED STATES.

The number of deaths in New York city last year was 28,458, being 1 to every 21·95 of the population; in Philadelphia the number of deaths was 11,811, or 1 to every 42·33 of the population; in Baltimore 5,738, or 1 to every 36·54 of the population; in Boston 4,418, or 1 to every 36·21 of the population. In New York the ratio of deaths by consumption was 951; in Philadelphia 842; in Baltimore 615; in Boston 579.

PROGRESS OF EPIDEMICS.

LOCAL REPORTS OF EPIDEMIC AND ENDEMIC DISEASES

During the Months of Dec., Jan., and Feb. 1855-6.

Place.	County.	Lat.	Long.	Observer.
Teignmouth -	Devonshire -	50.32 N.	3.29 W.	W. C. Lake, Esq.
Odiham - -	Hampshire -	51. 8 N.	1. 3 W.	J. M'Intyre, M.D.
Bridgewater -	Somerset -	51. 8 N.	3. 0 W.	Alfred Haviland, Esq.
Canterbury -	Kent - -	51.17 N.	1. 4 E.	G. Rigden, Esq. / James Reid, Esq.
Chatham -	Kent - -	51.24 N.	0.14 E.	F. J. Brown, M.D.
Putney - -	Surrey - -	51.28 N.	0. 3 W.	R. H. Whiteman, Esq.
Up. Holloway	Middlesex -	51.32 N.	0.03 E.	W. B. Kesteven, Esq.
Wanstead -	Essex - -	51.32 N.	0. 2 W.	F. Collins, M.D.
Swansea -	Glamorgansh.	51.38 N.	3.50 W.	W. H. Michael, Esq.
Saffron Walden	Essex - -	52. 3 N.	0.12 E.	T. Spurgin, Esq. / H. Stear, Esq.
Bedford - -	Bedfordshire -	52. 8 N.	1.51 W.	T. H. Barker, M.D.
Sharnbrook -	Bedfordshire -			R. S. Stedman, Esq.
Wellingbro' -	Northamptons.	52.10 N.	0.40 W.	B. Dulley, Esq.
Thetford -	Norfolk - -	52.26 N.	0.45 E.	H. W. Bailey, Esq.
East Dereham	Norfolk - -	52.40 N.	0.57 E.	J. Vincent, M.D.
Pontesbury -	Shropshire -	52.43 N.	2.50 W.	Wm. Eddowes, Esq.
Nottingham -	Nottinghamsh.	52.50 N.	1.10 W.	T. Robertson, M.D.
Burton-on-Trt.	Staffordshire -	52.53 N.	1.53 W.	S. Thomson, M.D.
Wrexham -	Denbighshire -	53. 2 N.	3. 1 W.	E. Williams, M.D.
Hawarden -	Flintshire -	53.11 N.	3. 2 W.	T. Moffat, M.D.
Lincoln -	Lincolnshire -	53.12 N.	0. 5 W.	S. Lowe, Esq.
Alford - -	Lincolnshire -	53.15 N.	0. 6 E.	R. U. West, M.D.
Gainsborough	Lincolnshire -	53.23 N.	0.47 W.	D. Mackinder, M.D.
Liverpool -	Lancashire -	53.24 N.	2.59 W.	Thos. Bickerton, Esq.
Bolton - -	Lancashire -	53.35 N.	2.19 W.	W. H. Pendlebury, Esq.
Wst. Auckland	Durham -	54.45 N.	1.40 W.	G. Todd, Esq.
Rothbury -	Northumberld.	55.25 N.	1.50 W.	E. C. Summers, Esq.

QUARTERLY STATEMENT—No. V.

[*The dates denote that the disease appeared in the weeks then ending.*]

SCARLET FEVER.

Teignmouth..Dec. 14, Jan. 4. [8-15
Canterbury..Dec. 28, Jan. 4-25, Feb.
Chatham..All Jan. & nearly all Feb.
Putney..All December
Upper Holloway..Feb. 8
Swansea..Dec. 7-21, Jan. 18, Feb. 1, 15
Saffron Walden..All Dec. and Jan.
Bedford..Dec. 7, Jan. 11-18
Sharnbrook..Dec. 21-28, Jan. 4, 18, Feb. 15-29
Wellingbro'..Every week to Feb. 15
Thetford..All Dec., Jan. 4-11, Feb. 15-29
East Dereham..Nearly all Jan. & Feb.
Pontesbury..Dec. 14-21 [8, 29
Nottingham..Every week except Feb.
Burton-on-Trent..Feb. 1, 15-22
Wrexham..Every week
Lincoln..Feb. 15-29
Alford..Jan. 25, Feb. 22
Liverpool..Every week
Bolton..Every week

MEASLES.

Bridgewater..Jan. 4, 11
Canterbury..Every week
Chatham..Dec. 14, Jan. 11-25, Feb. [15-29
Swansea..Dec. 14, Jan. 4
Wellingborough..All Feb.
Thetford..Every week

Nottingham..All Feb.
Wrexham..Dec. 28, Jan. 4-18
Hawarden..Dec. 28, Jan. 4
Liverpool..Every week
Bolton..Dec.21-28, Jan.4, 25, Feb.1-15
Rothbury..Jan. 4

SMALL-POX.

Canterbury..Every week
Chatham..Jan, 18-25, Feb. 1, 15, 29
Putney..Feb. 15-22
Upper Holloway..Jan. 11
Bedford..Dec. 7, 21, Feb. 8-29
Wellingborough..Feb. 22-29
Nottingham..Dec. 7
Alford..Feb. 15-22
Liverpool..Every week

HOOPING COUGH.

Odiham..Dec. 28, all Jan. and Feb.
Canterbury..Every week
Chatham..Feb. 1, 22, 29
Putney..All Jan. and Feb.
Upper Holloway..Jan. 18-25
Wanstead..Jan. 25, Feb. 1, 15
Saffron Walden..Every week
Sharnbrook..Feb. 29
Thetford..All Dec. and Jan.
East Dereham..All Dec. and Jan.
Nottingham..Every week
Burton-on-Trent..Jan. 25, Feb. 29
Hawarden..Jan. 18-25
Lincoln..All Dec.
Alford..Feb. 15-29
Gainsborough..Every week
Liverpool..Every week
Bolton..Dec.21-28, Jan.4, 25, Feb.1-22

CROUP.

Teignmouth..Dec. 7
Odiham..Feb. 1, 15
Bridgewater..Jan. 18
Canterbury..Dec. 21-28, Jan. 18
Wanstead..Dec. 28
Wellingborough..Feb. 15
Thetford..Dec. 21
Nottingham..Dec. 14, Jan. 5
Burton-on-Trent..Feb. 8
Alford..Feb. 1
Gainsborough..Dec.7, Jan.11-25, Feb.1
Liverpool..Feb. 29
Bolton..Jan. 11-18

CATARRH.

Teignmouth..All Dec. & Jan., Feb. 1, 8, 29
Odiham..Every week
Bridgewater..Dec. 28, Jan. 4
Canterbury..Every week
Chatham..Every week
Putney..Every week except Dec. 14
Up. Holloway..Jan. 4, 25, Feb. 1, 15, 22
Wanstead..All Dec. and Jan.
Swansea..Every week
Saffron Walden..Every week
Bedford..Dec. 7, 28
Sharnbrook..Dec. 21-8, all Jan., Feb. 1
Wellingborough..Every week
Thetford..Dec. 7, 21, 28, Jan. 11-25, Feb. 1, 8, 22, 29
East Dereham..All Feb.
Pontesbury..Dec. 14-28, Feb. 1-22
Nottingham..Every week
Burton-on-Trent..All Feb.
Hawarden..Feb. 8
Gainsborough..Every week
Liverpool..Every week
Bolton..Dec.14-28, Jan.11-25, Feb.1, 8
Rothbury..Every week

INFLUENZA.

Teignmouth..All Dec. & Jan., Feb. 1, 15, 29
Odiham..Every week except Feb. 22, 29
Bridgewater..Jan. 4
Chatham..Dec. 21, 28, Jan. 4, 11, Feb. 1-22
Putney..Jan. 25, all Feb.
Wanstead..All Dec. & Jan., Feb. 1, 8.
Swansea..Feb. 1-29
Saffron Walden..Dec.28, all Jan. & Feb.
Bedford..Every week except Jan. 25 and Feb. 29
Sharnbrook..Dec. 28, Jan. 18
Wellingborough..All Jan. & Feb.
Thetford..All Dec., Jan. 4, 18, 25, Feb. 1, 15, 29
Pontesbury..Feb. 15, 22
Nottingham..All Dec. & Jan., Feb. 29
Burton-on-Trent..Feb. 8-22
Lincoln..Feb. 1-22
Alford..Dec. 21
Gainsborough..Dec. 28, all Jan.
Liverpool..Dec. 14, Jan. 4, 18, 25, Feb. 8, 29
Bolton..Jan. 18, 25, Feb. 1

ERYSIPELAS.

Teignmouth..Feb. 8
Odiham..Dec. 21, Feb. 1, 15
Canterbury..Jan. 4, 25, Feb. 1, 8, 22
Chatham..Dec.14, 21, Jan.4-18, Feb.15
Putney..Feb. 8
Wanstead..Dec. 7-21, Jan. 4, Feb. 8.
Swansea..Jan. 11, Feb. 15-29
Saffron Walden..Jan. 11, 25, Feb. 15
Bedford..Dec. 7, Feb. 1-15
Sharnbrook..Dec. 7, Jan. 4, 18
Wellingborough..Jan. 25, Feb. 1-15
Thetford..Dec. 14-28, Jan. 11, 25, Feb. 15-29
Pontesbury..Jan. 25, Feb. 1-22
Nottingham..Dec. 14-28, Jan. 11-25, Feb. 1-29
Wrexham..Jan. 25, Feb. 1-22
Alford..Feb. 1
Gainsborough..Dec. 28, Jan. 4-25
Liverpool..Dec. 14, 21, Jan. 4, 11, 25, Feb. 8-29
Bolton..Dec.21, 28, Jan.11-25, Feb.1-15

CHOLERA.

Liverpool..Feb. 8.

AGUE.

Canterbury..Jan. 4, Feb. 8
Bridgewater..Dec. 14
Chatham..Dec. 7, all Jan. and Feb.
Sharnbrook..Dec. 28, Jan. 4, 25, Feb. [1-15
Wellingborough..Feb. 8-29
Thetford..Dec. 14, Feb. 8

REMITTENT FEVER.

Teignmouth..Jan. 25
Odiham..Jan. 11, Feb. 29
Putney..Dec.21, Jan. 18, Feb. 8, 22, 29
Swansea..Jan. 18, 25, Feb. 8-29
Saffron Walden..All Dec. and Jan.
Wellingborough..Jan. 18
Thetford..Dec. 7, 21, Jan. 11, Feb. 22
Burton-on-Trent..Feb. 29
Wrexham..Feb. 15-29
Alford..Dec. 7-21, Jan. 11, 18
Liverpool..Dec.7, 21, Jan. 11, 18, all Feb.
Bolton..Dec. 14-28, Jan. 18, 25

DIARRHŒA.

Teignmouth..Every week except Dec. 14 and Feb. 15
Odiham..Jan. 18, 25, Feb. 8
Bridgewater..Dec. 14 28, Feb. 1-15
Chatham..All Dec., Jan. 4, 18, Feb. 8-29
Putney..Dec. 7-21, Jan. 11-25, Feb. 1-15
Wanstead..Dec. 28, Feb. 22, 29
Swansea..Dec. 21, Jan. 4, 18, Feb. [15-29
Saffron Walden..Every week
Bedford..Nearly every week
Sharnbrook..Dec. 21, Jan. 11, 25, all [Feb.
Wellingborough..Jan. 11
Thetford..Nearly every week
East Dereham..Feb. 8-22
Pontesbury..Jan. 4, 11, Feb. 15, 22
Nottingham..Dec. 14-28, Jan. 11-25, Feb. 1, 8, 22, 29
Burton on-Trent..Feb. 8
Hawarden..Every week
Alford..Dec. 21, Feb. 22
Gainsborough..Dec. 21, all Jan., Feb. [1, 22, 29
Liverpool..All Dec., Jan. 25, Feb. 1-22
Bolton..Jan. 18, Feb. 1, 8

DYSENTERY.

Upper Holloway..Feb. 22
Wanstead..Dec. 7
Bedford..Feb. 8
Pontesbury..Feb. 8-29
Nottingham..Dec. 14-28, Jan. 11-25, [Feb. 22-29
Wrexham..Dec. 21
Lincoln..Jan. 25, Feb. 1
Gainsborough..Jan. 11-25
Liverpool..Feb. 8-22

TYPHUS.

Odiham..Dec. 7, 14. Jan. 11, Feb. 22
Bridgewater..Every week
Canterbury..Dec. 7-21, all Jan., Feb. 1-15
Chatham..Dec. 14, 28, Jan. 18, 25, Feb. [15, 29
Wanstead..Jan. 11-25, all Feb.
Saffron Walden..All Dec. and Jan.
Bedford..Dec. 14, Jan. 25, all Feb.
Sharnbrook..Every week
Wellingborough..Jan. 18
Thetford..Jan. 11-25, Feb. 8
East Dereham..Dec. 21, 28, all Jan. & [Feb.
Pontesbury..All Feb.
Nottingham..Dec. 7-21, Jan. 4-18, [Feb. 11
Alford..Feb. 22
Gainsborough..Every week
Liverpool..Every week
Bolton..Jan. 25, Feb. 1-29
Rothbury..All Jan. and Feb.

PUERPERAL FEVER.

Thetford..Dec. 21, 28, Jan. 4
Burton-on-Trent..Feb. 22
Liverpool..Dec. 21, Feb. 22, 29

CARBUNCLE.

Odiham..Dec. 28, Jan. 25
Bridgewater..Every week
Canterbury..Dec. 14-28, Jan. 11
Chatham..Dec. 28, Jan. 18, Feb. 8
Putney..Jan. 11
Wanstead..Dec. 14, Feb. 8
Swansea..Jan. 11, 18
Saffron Walden..Jan. 4, Feb, 8, 15
Sharnbrook..Dec. 7, 14, Jan. 18
Thetford..Jan. 18, Feb. 8
Nottingham..Dec. 21, 28, Jan. 4, 18, [Feb. 1, 8
Burton-on-Trent..Feb. 22
Wrexham..All Feb.
Liverpool..Feb. 22, 29
Bolton..Dec. 14, 21, Feb. 8

ADDITIONAL OBSERVATIONS.

Teignmouth. Mr. Lake has sent us an elaborate meteorological report of Teignmouth, for the months comprised in these returns; but we regret that want of space prevents us from publishing it in the present number. With regard to disease, he says :—

"The most prevalent form of influenza during this quarter was that in which the bronchial symptoms were slight, or

almost entirely absent, together with a quick pulse, thirst, loss of appetite, alternate flushes and chills, and a general febrile state, with considerable loss of strength and depression of spirits; the most prominent feature was the severe aching pains affecting the head, trunk, and limbs. Of thirty-two cases of which I have notes, only seven presented severe or well marked bronchial symptoms; in sixteen there was catarrh, with a little cough; in twenty-two out of the thirty-two the neuralgic element predominated; in nine it existed to the exclusion of the catarrhal. These pains were also sometimes felt in the clavicular and sternal region, over the ribs, and occasionally over the sides of the abdomen, and during convalescence were often most annoying in the flexures of the knees, the calves and shins. The tongue was usually softly coated, though having a rather flabby and sodden aspect; it was seldom pointed. Nausea was frequently present, but vomiting only in three cases out of the thirty-two; diarrhœa only in one or two. The bronzing of the skin, though generally present, was not so to a great degree. Severe cases were attended by delirium; and one old woman of seventy, in whom the bronchial symptoms were severe and the nervous depression great, was much harassed in her waking state by ocular spectra. In some cases there was considerable irritation; irritation of the uterine system, especially during pregnancy, after delivery, and in other states of activity of the uterine functions. Herpes about the lips and vesications in the roof of the mouth occurred, but not so commonly as last year. The influenza was not very prevalent amongst children, nor were any of the cases that came under my notice fatal, though several were severe. The cases of scarlatina mentioned as occurring in December and January were very mild."

Odiham. Dr. M'Intyre says:—"The healthiness of this district has continued. No such exemption from disease during the winter months has occurred for many years. The cases that have occurred have been chiefly catarrh, influenza, bronchitis, pneumonia, neuralgia, and rheumatism; the last in several cases, in the form of rheumatic fever, severe and protracted. Three cases of acute croup occurred during the first three weeks of February. No death occurred in our parish; in the neighbourhood hooping-cough has been epidemic, but no deaths have occurred. In another parish measles had prevailed, but no case has come under my observation: several deaths have occurred from it with typhoid symptoms."

Canterbury. Mr. Rigden writes:—"The prevailing zymotic diseases in this city and neighbourhood during the past quarter have been principally measles and hooping-cough. About one hundred and fifty cases of the first-named disease have been under my own care, and a large number of children with this disease have not had medical attendance: it has, however, proved fatal to but nine patients during this period. Small-pox, I hope, has now left us, or more properly speaking has afflicted all those who, by neglect of vaccination, are most subject to its influence."

In addition to Mr. Rigden's report, the following communication has been forwarded to us by Mr. James Reid, of Canterbury, honorary secretary to the East Kent and Canterbury Medical Society.

Abstract of the Report of Zymotic Diseases in the city of Canterbury during the Winter Quarter, 1855-6.

The results are obtained from nine different observers, who furnish monthly returns of epidemic diseases for the use of the medical society; they are embodied in the table at pp. 85-7.

"The variations of temperature during the quarter have been very considerable, from severe cold and strong easterly winds, that prevailed in the middle and latter part of December, to warm, close, spring-like weather, which prevailed for some days both in January and February.

"During the quarter the following meteorological results have been observed.

	Dec.	Jan.	Feb.
Lowest temperature in the day time ..	19°	29°	30°
Highest	47°	49°	50°
Mean..............................	34°	39°	40°
Lowest temperature during the night..	18°	26°	28°
Highest	45°	49°	47°
Mean..............................	31°	36°	37°
Lowest point of barometer	29·20	28·87	29·61
Highest	30·17	30·32	30·35
Mean..............................	29·73	29·41	29·88
Amount of rain	2·32	2·07	·91

"The total amount of rain during the year ending December 31st, 1855, at Canterbury, was 23·37 inches.

"During December the prevailing winds were W. to N. During January the prevailing winds in the first half of the month were E. to S. and N. equally, during the latter half W. to S. During February the prevailing winds were W. to S., and next in order E. and N.E. There was considerable fog and mist on several days this month.

"The most prevalent zymotic disease has been measles; two hundred and thirteen cases have been returned. In the

summer quarter of 1855 measles occasionally occurred, the disease having appeared in June amongst some troops recently marched from Chatham. In the early part of the autumn, also, cases were observed; but suddenly, on the 25th of November, the disease became epidemic and spread to all parts of the town. The return for the month of February is the highest for the three months. The mortality in the cases returned is 3·75 per cent. The complications of the disease have been pneumonia and pertussis, but in proportions to give the epidemic at present a mild character. Many cases are not seen by medical men. The disease likewise prevails in the surrounding villages.

"The next disease in order of frequency has been small-pox, which has been epidemic about twelve months, and now appears to be gradually subsiding. Thirty cases have been reported during the quarter, the rate of mortality in these being 13·33 per cent. The fatal cases all occurred in unvaccinated subjects; of those attacked with the disease 36·6 per cent. were not vaccinated, and 63·3 per cent. had been vaccinated. Several of the vaccinated had the disease in a confluent form, but, for the most part, they had it in a much modified degree. Two instances occurred of the co-existence of small-pox and the vaccine disease. In one, variola appeared on the ninth day after vaccination, in a confluent form, but was influenced by the vaccine disease: it was reported to have been three days slower in its progress than the natural disease. In the other instance small-pox appeared on the tenth day after vaccination; the vaccine disease having matured thoroughly, the varioloid disease was quickly modified, the pustules in various degrees of development shrivelled on the sixth day, and speedily vanished. An instance is mentioned of varioloid fever followed by no eruption, though pain in the head persisted long after the usual period of the primary fever. The subject of this attack had small-pox in childhood, and small-pox prevailed in the family at the time of the present illness. One of the fatal cases occurred in a child six days after birth, the mother having had the eruption of modified small-pox two days after giving birth to the child.

"Scarlatina, which has prevailed since the autumn of 1853, appears to have gradually subsided—indeed, it may almost be considered to have returned to a sporadic condition: six cases are noticed, one of which was fatal from bronchitis.

"The mortality in fever has been at the rate of 6·25 per cent.

"Pertussis has been more prevalent, and has been com-

plicated with broncho-pneumonia and rubeola: the mortality has been 5·88 per cent.

"Erysipelas has been rather more prevalent, principally idiopathic of the head and face: nearly half the cases returned occurred in the hospital."

Chatham.—Dr. F. J. Brown writes: "The direction of the wind was observed on eighty-two days out of the ninety-one, in the quarter ending 29th of February. It was east (either due or conjoined with another wind), on twenty-seven days. There was haze or fog on ten days out of the ninety-one. The weather was exceedingly cold in the early and middle portions of December: since then, it has been unusually warm.

"Catarrh and influenza have been prevalent; also diarrhœa and biliary disorder. There has been a great amount of erysipelas. Scarlatina entered the town in January, and has hitherto confined itself to one portion, for the most part. Paludal fever, in the shape of eyebrow ague, has been very common. Hæmorrhagic cases have been unusually numerous; the list including apoplexy, bleeding at the nose, spitting and vomiting of blood, bright intestinal hæmorrhage, and uterine hæmorrhage. One case of typhoid fever, in a boy aged 11 years, deserves mention. On the fourth day of the disease, hæmorrhage from the intestines occurred suddenly, to the amount of eight ounces; and again on the sixth day, and half that quantity on the seventh day. The fever turned on the fourteenth day. I treated the case with acetate of lead and acetic acid, cold beef tea, sulphuric ether, and Dover's powder; and I applied a blister over the right iliac region. Two cases of painful erythema have occurred in the form of red patches of great extent over the body, succeeded by thin and extensive cuticular exfoliation."

Putney.—Mr. Whiteman says: "The temperature of the last three months has been so variable as to be productive of a large amount of disease in this district. Ozone has varied very greatly in amount. Catarrh and influenza have been very prevalent. A few cases of scarlatina were observed at the latter part of December; and what is very unusual in January and February, diarrhœa of a rather severe character attacked persons of all ages, amongst the poor especially. Hooping-cough, however, has been the prevailing epidemic for the last two months, scarcely a family where there were young children escaping. Happily, it has not been very fatal. Out of some fifty cases of considerable severity, two

patients only have died, and those were scrofulous children. Two cases of small-pox in adults were treated about the middle of February, both the patients having been successfully vaccinated when young.

"A comparison of the rate of mortality amongst the poor at the two periods of 1844 and 1854, shows a greatly improved state of the public health in this district, which is highly satisfactory.

"Through the assistance of the registrar of the district, I was enabled to make an analysis of the deaths in this parish in the year 1844. I fixed upon that year, chiefly because it seemed to be a period in which no particular epidemic had prevailed. I find in that year, that eighty-nine deaths took place in Putney. Of this number, fifty-one were males and thirty-eight were females. Of the total number, considerably more than one-third were children under four years of age. These eighty-nine deaths were distributed as follows:—

Amongst families of gentry and professional men	11	
Amongst tradespeople - . .	12	89
Amongst the labouring classes . .	66	

"It will be perceived, then, even though we allow the labouring classes to have out-numbered the gentry and tradespeople in the proportion of two to one, the mortality will have been most excessive amongst the poor in this year.

"At the close of the year 1854, a similar calculation to the above was made. The sickness amongst the poor in this parish has increased considerably with the increase of population; but the mortality amongst the same class has diminished in an inverse ratio with the increase of population; and this, it is believed, is owing to the adoption of many wise sanitary measures and improvements since 1844. The sixty-six deaths amongst the labouring classes out of the eighty-nine which occurred in 1844, must be looked upon by all as being excessive on the side of the poor. Ten years afterwards, viz., in 1854, only *thirty-five* pauper deaths took place out of 1363 cases of pauper sickness! This gives 2·5 per cent. of deaths only in that year, although it was one in which a serious outbreak of cholera occurred."

Wanstead.—Dr. Collins writes: "A typhoid fever, running into typhus, has prevailed during the past two months; it has been confined chiefly to one spot, which is crowded with badly-drained, ill-ventilated huts, situated in the Grove: three deaths out of about fifty cases coming under my treatment have already occurred; and there have been many fatal cases within three miles."

Swansea.—Mr. Michael says: "Isolated cases of scarlatina continue, also of measles; but they are so slight as scarcely to demand treatment. There is an almost entire absence of disease; and cases of illness generally recover. There has been very fine weather during the greater part of the winter quarter."

Saffron Walden—Mr. Spurgin writes that "Rheumatism and bronchitis have been the prevailing diseases of the quarter. Cases of typhus and remittent fevers have been frequent in the neighbourhood. On the whole, however, the season must be considered healthy. Scarlatina and hooping-cough are on the decline, the former having now nearly disappeared. Diffused cellular abscesses and ecthyma have been unusually prevalent, but are now declining. Influenza has been common among horses. Prevailing wind, westerly. Vegetation backward."

Mr. Stear also says: "There has been, during the last three months, a remarkably small amount of illness—about one-third as compared with the correspondent months of last year. The poor in my district have been very healthy: for more than a month, not a single death occurred in a population of 6000. Hooping-cough is very prevalent. The weather is very changeable, but generally mild for the time of year; and the wheat is looking well."

Bedford.—Dr. Barker says: "During the past quarter, cases of diarrhœa and influenza have been numerous: small-pox, principally a modified form, has appeared in some families in Bedford. Severe cases of fever have occurred in the neighbourhood, during February and the latter part of January. The entire quarter has been characterised by remarkably changeable weather."

Sharnbrook.—Mr. Stedman says: "Typhus has been unusually prevalent, but has been principally confined to the village of Felmersham (in a straight line, about three-quarters of a mile from Sharnbrook), situated on the right bank of the river Ouse. During the last eight months, nearly 100 cases of typhus have occurred in that place and its neighbourhood, under my own observation: many of the cases have been complicated with diarrhœa. In two cases only has death occurred. In another village, out of my own district, higher up the river, but on the same bank, typhus has also been prevalent."

Thetford. Mr. Bailey says: "Scarlatina continued very prevalent throughout the town and neighbourhood, to the

middle of January, when, during four weeks, no new case occurred; but from the middle of February to the end, several cases came under treatment. It still bore its mild type, requiring but little medical aid. A fatal case occurred in a very young infant. Measles was very prevalent throughout the quarter, attacking all ages. In some cases the inflammatory symptoms were very severe, and the cough most intense, requiring active depleting treatment. This state, I have no doubt, was produced by the atmospheric changes. The month of December proved considerably below the average; and the difference of temperature only in a few hours was 26° and 30°. Such a sudden transition had a serious effect upon the human system, especially on those affected with pulmonary diseases. Not only measles, but hooping-cough (which continued epidemic), became very severe in their symptoms, requiring blisters, etc., prolonging the disease, and occasioning excessive debility. Catarrhs and influenza have been more general than in last quarter; the symptoms more severe, and the cough and sense of suffocation, in many cases, very distressing. In the aged, and in young children, fatal cases have taken place. The vicissitudes of heat and cold which have been experienced during this quarter have given rise to numerous cases of diarrhœa, both in old and young subjects, producing extreme prostration of power; in some instances, nearly approaching the choleraic character. Children were more affected with it than adults. Many cases of cynanche tonsillaris have occurred in the last two months, arising from imprudent exposure, and accompanied by smart febrile symptoms: some cases terminated in abscesses of the tonsils. Typhus fever came under our notice in four cases, occurring in labouring men, and running a long course. Two cases were followed by abscesses, and dropsical effusions of the lower limbs. One case of puerperal fever occurred, which terminated fatally after five days: the labour was natural, and only of four hours duration; no milk was ever secreted, and the lochial discharge was not suppressed until the day before death. No other case has occurred, although I have attended many cases of labour since. This is the fourth case I have attended during forty-five years practice, and the second death. Owing to the mild weather in the last month, the diseases have been but few: only three cases of scarlatina and two of measles. Hooping cough has entirely left the town. A few cases of rheumatism, both chronic and acute, have come under notice. Catarrhs and influenza have been less frequent. Such a

paucity of disease can only be accounted for by the equal pressure of the atmosphere, the absence of wind, the low state of the hygrometer during the month, indicating the dry state of atmosphere and the little rain fallen, not amounting to three-quarters of an inch. The diseases which are uninfluenced by weather, and under medical treatment, were—paralysis, nephritis, cystorrhœa, iritis, dyspepsia, gout, hydrocele, syphilis, leucorrhœa, menorrhagia and cephalalgia, with some cutaneous diseases. I find, upon inquiry of our veterinary men in the neighbourhood, that influenza has been very prevalent with horses and cattle—enteritis and pneumonia also. There has been less disease among sheep.

"The following record of deaths has been extracted from the Registrar's Book :—

December.		*January.*		*February.*	
Decay of nature....	1	Measles	5	Decay of nature	1
Debility	4	Decay of nature....	1	Debility	1
Paralysis	1	Puerperal fever	1	Measles	1
Nervous exhaustion	1	Pneumonia........	2	Atrophy	1
Measles	4	Typhus	1	Consumption	3
Convulsions	1	Diarrhœa	2	Dropsy............	1
		Hepatitis..........	3	Varicella	1
		Consumption	5	Hydrocephalus	1
		Hooping cough	1	Bronchitis	1
		Debility	1		
		Convulsions	1		
		Endocarditis	1		
	12		24		11

East Dereham.—Dr. Vincent says: "Most of the cases of scarlatina have been mild. Typhus has been prevalent in the villages around Dereham, and I have been able to trace its progress from the house where it originated, to the houses of brothers and other relations, who have had communication with the party first attacked. In many instances, the cottages where it occurred have been the cleanest and best placed in the village."

Burton-on-Trent.—Dr. Spencer Thomson writes: "One fatal case of scarlet fever occurred in a woman, aged forty-five, who was seized two or three days after her confinement. One of her children had just passed through the disease, in a form apparently mild. Throughout February, catarrh, influenza, and bronchitic attacks have been unusually prevalent, especially a few days after the weather became mild."

Wrexham.—Dr. E. Williams states that acute rheumatism was prevalent during December and the early part of January.

Alford.—Dr. West says: "Acute rheumatism has been very prevalent during the past quarter, as also intermittent neuralgic affections. The season has been very rainy."

Gainsborough.—Dr. Mackinder writes: "The diseases of this quarter have been of an adynamic type, and required a more than usual amount of stimulants. Of croup, erysipelas, and diarrhœa, there have been a few cases; many of catarrh, bronchitis, and typhoid; and hooping-cough has been epidemic. In a neighbouring village, there has been a case of small-pox after vaccination in an adult. I have had several cases of chronic inflammation of the inguinal glands, some terminating in resolution, others in suppuration. The patients were of different sexes, and their ages varied from 17 to 60. Except in one or two cases, no tangible cause could be assigned."

The subjoined meteorological report has been furnished by Mr. Dyson. "The weather, during the quarter ending Feb. 29th, has been peculiar. The month of December was unusually cold, the average of the month being little above the freezing point, and on the night of the 22nd the temperature fell to 21° of Fahrenheit. Fog was prevalent, and snow fell on the 6th, 7th, 8th, 9th, and 10th. The Trent was frozen over for several days, commencing on the 21st. Very little rain fell, the rain and snow together producing water only to the depth of half an inch. With the exception of a few days at the beginning, January was a cold month, and the Trent was a second time closed by ice; very little snow fell; rain nearly 2½ inches. February was particularly mild, but the sky for the greater part of the month covered with cloud. The amount of rain which fell was less than an inch. The amount of ozone developed during the quarter was insignificant. In December, the greatest heat was 48° on the 14th; the greatest cold, 21° on the 22nd. In January, the maximum of heat was 50° on the 24th, and the minimum 22° on the 13th. In February, the highest range of temperature was 55° on the 9th, the lowest 26° on the 2nd. Several meteors were observed; one was especially brilliant on the 3rd. Lunar halos, displaying the prismatic colours, were prevalent from the 13th to the 17th of February. The quarter is remarkable for the intense cold during the first half, and for the mildness of the second."

Liverpool.—Mr. Bickerton makes the following report. "Dec. 7th, 1855. Scarlatina, measles, and hooping-cough, prevailed in an unusual degree. During the week there

were 74 deaths from these three diseases alone, viz., scarlatina, 38; measles, 20; hooping-cough, 16: also from typhus, 8; small-pox, 1; syphilis, 2. The deaths from measles were more frequent than in any week of the previous 17 months. Scarlatina had been epidemic nearly four months, and had destroyed upwards of 500 lives. Diseases of the lungs caused 82 deaths. The total number of deaths in the week was 257; 173 were children, of whom 154 were below the age of five years. I attended one case of confluent small-pox in an adult, 22 years of age, who never was vaccinated; he died from pneumonia, on the twenty-first day.

"Dec. 15th, 1855. 274 deaths were registered from all causes during the week, being 31 more than the corrected average for the same week in previous years. Scarlatina caused 21 deaths; hooping-cough, 23; measles, 15; typhus, 7; small-pox, 3 (1 after vaccination); syphilis, 1. The mean temperature for week was 36, being 7½ below the average of the same week last year.

"Dec. 22nd, 1855. 244 deaths from all causes occurred during the week, being 11 above the corrected average for previous seven years. Zymotic diseases caused 67 deaths; viz., scarlatina, 17; hooping-cough, 15; typhus, 5; small-pox, 1; measles, 15. Inflammatory diseases of chest caused 59 deaths, and phthisis 33. The effect of the severe weather was chiefly felt by infants and children; 141 deaths occurred in children below 5 years, and 33 in persons above 60.

"Dec. 29th, 1855. The number of deaths was 244, being the same as in the previous week, and about equal to the corrected average of the corresponding week for previous seven years. The deaths in the parish were 164, and 80 in the out-townships. The deaths from zymotic diseases amounted to 68, viz., from scarlatina, 24; hooping-cough, 14; measles, 11; typhus, 4; small-pox, 1. Inflammatory affections of the lungs caused 65 deaths; phthisis, 21.

"During the quarter ending 29th Dec. 1855, 3,231 deaths were registered in the borough, including 157 on which inquests were held; being 100 less than the corrected average of the same quarter of the preceding eight years. The deaths from zymotic diseases were 200 more than the average, owing to the prevalence throughout the entire quarter of scarlatina, which occasioned 447 deaths. Measles caused 155 deaths; hooping-cough, 152; diarrhœa, 112; typhus, 96; tracheitis, 43; syphilis, 24; small-pox, 15. No death took place from cholera, this being the second quarter in which such absence has occurred during the last eight years.

"Jan. 5th, 1856. 218 deaths occurred in the week from all causes, the corrected average for the previous eight years being 250. Diseases of lungs for previous four weeks had been respectively 107, 92, 86, 74. Corresponding with this decreasing mortality, there had been an increase in the temperature. The mean, which the two previous weeks averaged more than 8 degrees below that of the same period of former years, was last week more than 2 degrees above it. Hooping-cough caused 24 deaths; scarlatina, 21; typhus, 6; measles, 5; small-pox, 2; syphilis, 2.

"January 12, 1856. 228 deaths occurred from all causes; being 22 less than the corrected average for previous eight years. The deaths from zymotic diseases were, from scarlatina, 28; hooping-cough, 20; measles, 9; typhus, 3; small-pox, 2. 66 deaths were caused by diseases of lungs. Of the 228 deaths, 128 were below 5 years, and 22 above 60.

"January 19, 1856. In consequence of the cold which had prevailed of late, there was a general increase of mortality for this week. The deaths from all causes were 252, the corrected average for former years being 204. The whole excess is accounted for by deaths occurring in chest affections, which were 98; being 66 in the previous week. There were from scarlatina, 24 deaths; hooping-cough, 22; measles, 7; typhus, 7; small-pox, 1 (previously vaccinated).

"January 26, 1856. 227 deaths were registered during the week; being 12 less than the corrected average of previous 7 years. Zymotic diseases. Sscarlatina, 13; hooping-cough, 20; measles, 7; typhus, 4; small-pox, 2. Diseases of lungs and consumption caused 99 deaths. A gentleman died from delirium tremens. 129 died below the age of 20; 73 between 20 and 60; 25 between 60 and 90.

"February 2, 1856. The mortality for this week was lower than in any week of the preceding three months. The deaths from zymotic diseases were fewer than for six months, and from typhus fewer than for twelve months previously. The deaths from all causes were 214; being 144 in the parish, and 70 in the out-townships. The corrected average of the same week of the seven years preceding was 286. Hooping-cough caused 23 deaths, scarlatina 12, measles 3, typhus 2, diarrhœa 5, cholera 1. From diseases of the lungs the deaths were 75; being 24 less than in the previous week. Rheumatism caused 3 deaths.

"February 9, 1856. The cold weather during the week caused an increase in the mortality. The deaths from all causes were 240; being 6 less than the corrected average

for the previous seven years. Diseases of lungs caused 98 deaths, scarlatina 16, hooping-cough 17, diarrhœa 6, measles 2, typhus 2, small-pox 2 (unvaccinated). The mortality from fevers generally was unusually low. Delirium tremens caused one death; and a married woman, aged 37, died from the continued use of opium. The temperature was 6 degrees below average, but increased latterly 13 above it.

"February 16, 1856. In consequence of the mild weather which prevailed from the 6th to the 16th of February, there was a decrease in the mortality. The total number of deaths registered in the week was 205; being 34 less than the corrected average of previous eight years. From zymotic class of disease there were—scarlatina, 17; hooping-cough, 10; diarrhœa, 8; measles, 4; typhus, 4; small-pox, 2; syphilis, 1; mumps, 1; and 85 from diseases of the lungs.

"February 23, 1856. 243 deaths were registered; being about the average, but above last week's report. Hooping-cough caused 14 deaths, scarlatina 12, tracheitis 6, measles 3, syphilis 2, varicella 1, typhus 5, small-pox 2, influenza 1, and erysipelas 1. Diseases of lungs caused 82 deaths. The unusual number of 27 infants died from convulsions and teething; and delirium tremens was fatal to 2 males."

Bolton.—Mr. Pendlebury writes: "Scarlatina has evidently been rather rapidly declining since the middle of January. The cases at present on hand are chiefly of the milder type, but very frequently are complicated with some pulmonary affection. Idiopathic erysipelas of the head and face was particularly prevalent during January and a portion of February, whilst the weather was rainy and the atmosphere cold. Although the majority of cases were very severe, yet they yielded readily to iron, or iron combined with quinine; thus proving their asthenic nature. There have been a few cases of continued fever, with gastro-enteric symptoms. The mortality has been somewhat less than in previous years,

Rothbury.—Mr. Summers says: "The weather during the past quarter has been changeable, but, on the whole, rather mild for the season; and at present there is every appearance of an early spring. As far as my knowledge goes, there has been but a single case of measles (fully developed), and the same of croup; but throughout the quarter catarrh has been epidemic, amongst both adults and children; and in numerous cases amongst the latter, it has seemed to assume croupy character, whilst many others have presented all the symptoms of measles except the eruption. Typhus is still prevailing, of a mild type generally,"

SANITARY LEGISLATION.

BILLS.

Metropolis Local Management Act (19 Vict., 22 February, 1856).—The Attorney and Solicitor-General have brought in a Bill to explain and amend the above-named Act. The bill declares that the expression " existing vestry," section 8 in the act, shall be construed to include all vestry meetings, meetings in the nature of vestry meetings, and meetings of the parishioners, inhabitants, or ratepayers generally; or of the parishioners, inhabitants or ratepayers rated at or above any specified amount or value, which might from time to time have been lawfully holden in the parish if the said act had not been passed. And from the time when, according to the said section 8, any " existing vestry" in a parish was to be superseded by the vestry constituted under the said act, all the duties, powers and privileges which might have been performed or exercised by an existing vestry, or any such meetings as aforesaid, shall be deemed to have become transferred to the vestry constituted by the above-named act, except so far as any duties, powers or privileges may, by section 90 of the act, be transferred to District Boards of Works. The bill further provides, that all duties and powers relating to the church, to the relief of the poor, or the administration of money or property for the poor, which at the time of the passing of the act were exercised by any commissioners, or any body other than the then existing vestry, shall continue to be exercised by such commissioners or other body as aforesaid.

Medical Officers of Health.—The greater number of the new appointments of Medical Officers of Health, under Sir B. Hall's new act, have been filled up; and in some instances the selections have been well made, in other cases the fortunate candidates are unknown in the sanitary world, and have yet to win their spurs in this field. There is abundant work before them; and such work as must show results, if it is well done. The mortality-tables of the Registrar-General will be a certain tell-tale of their exertions.

Nuisances Removal Bill—Scotland (19 Vict., February 26, 1856).—This Bill, brought in by the Lord-Advocate, provides for the repeal of preceding acts; places the superintendence of the execution of the act in the hands of the " General Prison Board," who may appoint medical inspectors; and entrusts the local administration to town councils,

where they exist, or to the jurisdiction of police commissioners; or to the parochial board of any parish where the jurisdiction of a town council does not extend. The local authority is to have the right of appointing inspectors of nuisances and lodging-houses. The word "nuisances," under this bill, is widely defined. It implies (*a*) any insufficiency of size, defect of structure, want of repairs, or other matter rendering any inhabited building unwholesome or unfit for human habitation; (*b*) any pool, watercourse, ditch, gutter, drain, privy, urinal, cesspool or ashpit, so foul as to be injurious to health; (*c*) any animal so kept as to be injurious to health; (*d*) any accumulation or deposit, within the limits of any burgh, or within *fifty* yards of any dwelling-house, injurious to health; (*e*) any work, manufactory, trade or business injurious to the health of the neighbourhood. The bill also relates to the prevention or mitigation of diseases; to the regulation of common lodging-houses, and to the mode of enforcing the provisions of the proposed act.

*** The Bill is carefully drawn up; and although evidently based on very limited knowledge and views as to the true meaning of sanitary science, it would, in the event of its becoming law, do some certain amount of service.

Burial Grounds (Ireland) Bill (1856), to amend the laws relating to the burial of the dead in Ireland. The Bill proposes to vest the management of burials in burial boards, and gives the Lord-Lieutenant power to restrain the opening of new burial places, and to order discontinuance of burials in specified places; and orders that every coffin shall be covered by at least fifty-four inches of earth.

Bill to consolidate and amend the Acts relating to Vaccination (1856).—The new Vaccination Bill is brought in by Mr. Cowper and Mr. Bouverie. It proposes to place vaccination under the local control of boards of guardians; a step, as we take it, at once fatal to success, even though such boards be placed under the superintendence of the Board of Health. Any legally qualified medical man may be appointed vaccinator, 2*s*. 6*d*. being the lowest fee for the operation. The bill is based on the compulsory system. Apropos to this bill, we have before us two interesting papers on state vaccination, from Dr. E. T. Hughes and Dr. Spencer Thomson. Both are in favour of compulsory vaccination; but Dr. Thomson suggests that all persons should have the privilege of selecting their own qualified medical man as vaccinator, and that such medical man should, within six months after birth, be allowed to select the time for the operation.

Bill to encourage the providing of Improved Dwellings for the Labouring Classes in Ireland (19 Vict., February 14, 1856).—This Bill, prepared by Sir W. Somerville and Mr. Hamilton, provides for the erection of tenements for the Irish poor, possessing certain requisites, such as stone walls, at least two separate rooms, a sufficient external window which can be opened for ventilation, a sufficient chimney built of stone, a sufficient privy, a separate pigstye, and an open space, 18 feet wide, before the dwelling.

REPORTS AND RETURNS.

Second Report of the Postmaster-General on the Post-Office (30 January, 1856).—The Duke of Argyll, as Postmaster-General, has brought out a very interesting report. At page 31 his Grace refers to the unhealthy condition of the homes of the letter-carriers, and makes the important suggestion of erecting model houses for them, near the General Post-Office, with moderate rents. Such a plan would save to the men time and trouble, and would be convenient to the department. It is proposed that such dwellings should be put up by a public company, rather than by government.

At pages 74-6, the report of the medical officer (Dr. Waller Lewis) occurs, and is highly satisfactory. By the present regulation, the medical officer has charge of 1,071 officers, and partial charge of 387 more, whom, in times of epidemic suffering, he visits at their own homes. During such times, also, he extends his supervision to 295 gentlemen with higher salaries, and to the officers of the departments generally. The chief diseases which Dr. Lewis has met with amongst the postmen are, autumnal diarrhœa and rheumatism. Out of 986 cases of disease in total, 76 were cases of rheumatism. No other diseases can be said to have prevailed extensively. About 50 per cent. of the officers under Dr. Lewis's care have received medical aid during the six months just elapsed. The deaths amount to nine, one in a clerk (consumption); eight amongst letter-carriers, three from consumption (ages under 30); one from hypertrophy of the heart (age between 50 and 60); one from dropsy (age between 50 and 60); and one from softening of the brain (age 30).

Of 300 candidates examined for office, 21 were rejected, from physical incapacity. Among the removable causes of disease, Dr. Lewis names "draughts of cold air from the doors of the Inland Circulation and Newspaper Office; escape of contaminated air from the men's water-closets into

different parts of the buildings; inefficient ventilation in the passages, lobbies, bag-rooms, and messengers' kitchens." The clerk of the works is now carrying out a plan for remedying these evils—some of which are already removed. The buildings appear to be perfectly dry.

Dr. Lewis, in conclusion, remarks on the insanitary condition of the private homes of the letter-carriers, and refers also to the propriety of erecting model houses for them, near the office, as some of them have to walk several miles in addition to the distances required by their duties.

District Lunatic Asylums in Ireland. (February 5th, 1856.)—A very interesting return, drawn up by Messrs. Donaldson and Wilkes, commissioners. It refers to the new district asylums, twelve in number. The statements of the commissioners, we regret to say, are unfavourable, as regards some of the more important sanitary requirements of these asylums. Owing to the extent of the corridors, an equable temperature cannot be sustained. The ventilation of the bedrooms is attempted in various ways, but in none effectively; they are close and offensive at night. The supply of water is derived from wells which, in many instances, have failed: the employment of patients to pump up the water is attended with ill consequences. Drainage is not super-excellent. The furniture fittings are scanty, and the bedsteads unsafe and totally unfit for an asylum.

The St. Pancras Workhouse. (1856.)—Dr. Bence Jones having been commissioned to inquire into the state of the St. Pancras Workhouse, has drawn up his report. It discloses a spectacle truly revolting. Whatever could be found in the way of filth, overcrowding, impure air, and such like disease-factors, Dr. Jones found in luxurious development.

The following are the author's remedial suggestions:— "The out-door relieving offices should be removed at once. Immediate steps also should be taken to lessen the crowded state of the house, by entirely removing the schools; for this, amongst other reasons, that an epidemic of low fever is at the present moment in the parish, and among the inmates, as is shown by the fact that during the first four weeks of this month (1st to 29th), forty-five patients have been attacked by fever. The arrangement by which the casual women are mixed with the women waiting for admission into the workhouse in the receiving ward is exactly that which is most liable to introduce and keep up an outbreak of low fever. These wards should be immediately separated. It is

very desirable that an entirely new building should be made for an infirmary, where the access of foul air would be prevented, and a perfect system of ventilation could be adopted. Meanwhile, if the only good building at present existing might be used as the infirmary, many of the immediate difficulties of the house would be obviated."

State of the Army in the Crimea. (1856.)—The report of Sir John M'Neil and Colonel Tulloch on the disasters of the Crimean army, while it fully supports the statements made by the press, presents numerous facts of grave interest, in a sanitary point of view. We must seize another opportunity to extract from this able and honest document the sanitary lessons which it teaches.

Mortality Registration in Scotland: Over-Legislation.—We are informed by our excellent fellow-labourer, Dr. John Webster, that the registration of births, deaths, and marriages, throughout Scotland, promises great results, supplies a desideratum long felt, and removes the opprobrium that North Britain was almost the only country in Europe where such registration was unknown. Still the measure is as yet defective, and, in one special point, highly objectionable; viz., that it obliges any medical practitioner, under a penalty of forty shillings, who shall have been in attendance during the last illness until the decease of any patient, to transmit within fourteen days after death a certificate of such death to the registrar. This proceeding is most arbitrary, and has justly given great umbrage to professional men. If legislators consider penalties advisable in such cases, they should place the responsibilities on the relatives of the deceased—certainly not on the medical attendant, who perhaps may only casually have seen the patient. What renders the compulsory clause more objectionable is, that no remuneration is provided for the medical attendant who is forced to supply the information.

When recently visiting Scotland, Dr. Webster met with various medical friends, who complained seriously of this grievance, and stated that they had actually been compelled under penalty to certify to the causes of the deaths of individuals to whom they had only given casual advice, and respecting whose disease and its subsequent fatal termination they retained scarcely any recollection. This is over-legislation, with a vengeance; and is not only unjust, but is sufficient to prevent anything like accuracy in the returns.

THE

JOURNAL OF PUBLIC HEALTH.

JULY 1856.

STATE MEDICINE IN GREAT BRITAIN.*

THE past quarter, from the number of works that have been added to sanitary literature, has been one of peculiar interest to the advocate of sanitary science. Foremost amongst these works is the volume of Mr. Rumsey on *State Medicine.* Until the appearance of this important volume, we had in the English tongue no comprehensive treatise on the all-engrossing topic discussed in its pages; and we are bound to say, however much we are inclined to dispute the views of its author, that for evidence of careful research, unwearied industry, calm judgment, manly expression of opinion, and originality of thought, the book is unexceptionable.

Bringing into free play a thorough knowledge of the laws of life, health, and disease, an acquaintance with all that has been done to advance sanitary measures in the united kingdom, and the energies of an enthusiastic mind, Mr. Rumsey has approached his novel task with the firmness of one who writes only on subjects which he has long and perseveringly studied; and as the reader of the *Essays* becomes more and more impressed with this fact as each page is perused, he sinks for the moment all differences of feeling, that he may follow the writer to the end of his argument. This point reached, the war of opinion begins; and if we in any degree understand the sentiments of the reading and thinking community, we fear our author will have to concede many modifications before he concludes a peace with the disciplined enemies who wait for him.

The work itself is made up of six essays. The first is entitled "The Outline of a Sanitary Code"; the second, "Edu-

* Essays on State Medicine. By H. W. RUMSEY. London: 1856. Churchhill.
Rapports Généraux des Travaux du Conseil de Salubrité pendant les années 1846 à 1848. Publiés par ordre de M. le Préfet de Police. Paris: 1855.
Over Legislation. The Westminster Review, July 1852.

cation in the Healing and Health-preserving Arts"; the third, "Sanitary Inquiry"; the fourth, "Medical Care of the Poor"; the fifth, "Local Sanitary Legislation"; and the sixth, "Health Police in relation to Local Sanitary Administration."

The first of these essays contains the substance of Mr. Rumsey's political plans and suggestions. With great labour and precision he lays down an outline of a sanitary code. It would be vain to attempt here to follow him in all his details; but reviewing the essay as a whole, its teaching is, that the English people should be made to accept the practice of sanitarian principles, under the influence of the control and direction of the government; that the government should organize one scientific central sanitary board, and other local boards in various districts of the country; that these boards, central and local, should have the care of the public health; that they should have power to act, to do, and to perform whatever they in their sanitary wisdom may consider necessary for the physical welfare of the subject; and that the said subject should be bound to submit, whether he understandeth or not, because it is all for his good, as he will see if he will wait and build largely on simple faith.

This is the key of our author's position, his Malakoff in true Russian sense. It is the proposed application to sanitary improvement of an old principle—govern, govern, govern. If it is necessary for a brother's health, as one shall think, that he rest his head for a few hours on a charmed pillow, go not by the roundabout way of proving to your brother how excellent is the plan you name, but down with him by your muscular arm, and if he rebel, enact Mrs. Jael, and put a nail through his temples to pin him safely to his good. Or, if a life-exhausted man shall solemnly say "he cannot swallow, he would rather die quietly", let him not die quietly, but fill him with wine; for is it not falser charity to leave him alone, than to choke him in administering the supposed—supposed only —*proper* restorative? In a word, strong men all, be strong and firm and resolutely active in driving your fellow men out of pigdom on to the delectable mountains. We say that Mr. Rumsey's plan is neither special nor novel; it is founded on the popular conviction that governments not only ought, but that they can do and compass all things. Yet what a radical error is here committed, let all who will observe say. The common fault-cry against the government is that it will not shake off routine, that it will not advance. Deputations press on ministers great public projects and improvements, and ministers receive deputations with smiles and courtesies,

and ministers approve of the spirit of the projects, and will consider them. Speculative geniuses in science and in art press on government boards and officials various suggestions, inventions, and plans; government boards and officials are obliged to the speculative geniuses for such suggestions, and will consider them or refer them. But neither the suggestion of the deputation, nor the work of science or art, gets much in the end from the government, although the government in its turn gets many hard blows for its negligence. These blows are, however, serenely borne, for they fall on innocent shoulders; it is not negligence, or indolence, or want of conscience, or lack of desire to do good, that holds the ministerial mind in check, but the oppression of over work, and the sensation of having tasks already before it, which it has not the time or the ability to perform. It is with governments as with individuals; the nonrealisation of labours which may be attempted, but which are by their vastness impossible, is too often accepted as a sign of innate weakness or of culpable neglect.

Again, in England, the administrative labours of our government are not only in themselves overpowering, but are by the nature of our constitution often entrusted to an ability of a second or even a third rate order. In our band of rulers there may be one or two men of great intellect and vigour, but that the majority of the band should perform their duties in such a way as to prove themselves more competent than the majority of the educated lookers-on amongst the masses, is impossible. And as it is impossible, so is it wise; for such is the force and the fascination of great mental talent, and such the extent of its own self-aggrandisement, that once placed in the position to know no hindrance, its ambition is unrestrained and its usurpation inevitable. Conscious of their own inherent strength, and of their power to guide their own actions, to support their own growth, to cultivate their own minds, the British people need dread no event so much as that of seeing brilliant ambition and overpowering intellectual force at work in the state. Liberal men with good common sense, armed with a desire to follow the instincts, the industry, and the learning of the people, and jealous ever for the honour and safety of their country, are here the only legislators required or desirable; and if it is to be lamented, on the one hand, that we do not always obtain even these qualities in our rulers, it is a source of satisfaction, on the other, to know that the *summum bonum* of legislative skill is in such qualities embodied.

That the legislature of Great Britain does not recognise the simplicity and unity of its true functions, is no argument against the correctness of the views we have propounded. On the contrary, it is seen and tolerably well understood, that whenever the government steps out of its simple administrative powers, in relation to war, peace, or those other affairs in which the mere administration of the national will is concerned, to legislate on our domestic or minor social concerns, it is plunged into difficulties which it cannot surmount and had better have left alone. The result is, if anything in such cases is done at all, that what is done is a compromise, or "a dab of legislation", which creates a furor for a moment, and then sinks down into a failing impracticable scheme, requiring a new "dab" every year, in the shape of an amendment, to keep it from sheer dissolution.

Amongst those who will unite with us, in thus criticising the evils of puny legislation, none will join more heartily than the author of the *Essays on State Medicine.* He acknowledges that "dabs" of legislation are beneath contempt, in all that concerns the preservation of the public health; and his *Essays* are themselves written mainly to show what a comprehensive measure of sanitary reform is open for construction, what a State Medicine there might be in England, if an English government would be bold enough to grapple with the whole question, draw up their own terms, and make the nation sign them. It cannot but be interesting to follow our author at this point through some of his suggestions, and see what the State, not every man individually, should do for the health of Fatherland.

First, the State should direct certain investigations bearing on public health, and relating to statistical, topographical, and jurisprudential questions; it should institute practical arrangements for personal health; and it should organise a machinery for carrying into effect the aforesaid investigations, and for the administration of the laws which might come under the State Medicine system.

In enumerating the details of his project, it is but fair to Mr. Rumsey to say, that he makes no one suggestion that would not be beneficial to the community if properly and spontaneously carried out. He has the clearest ideas as to the essentials for healthy and comfortable homes. He proposes model advantages for his race: fresh air, green trees, the cleanly threshold, the pure drinking stream, the unpoisoned food, the healthy marriage union, the innocent and vigorous exercise of the mind and body, recreation and re-

laxation from toil, the emancipation of wretched women from the abyss of pollution, the due disposal of the dead, the possession of hospitals and almshouses everywhere for the sick and the destitute, the subjection of all classes of the people to scientific medical supervision, and the suppression of the leading causes of disease both in man and in his lower earthmates.

How fully we coincide with Mr. Rumsey as to the advantages that would follow from the development of these suggestions, we need not say. But we look upon him as one who, seeing the goal, is so unfortunate in groping for the road that leads to it, as to walk continually around it, ever in the circle. He sees what is excellent to man, yet in so seeing he ignores man himself, his individuality, his tastes, his education, his rights. He assumes that by beginning to cast into perfect shape the dead matter, he can end by conquering the living mind. He erects the model dwelling-place, not for the man and his gratefully acknowledged happiness, but for the State, with its paternal and rigidly enforced system.

On the subject of "Education in the Healing and Health Preserving Arts", the author of the *State Medicine* is so broad and sound in some of his views, that the most philosophic liberal might agree with him in many essential points. But here, again, the idols of governmental power, wisdom, and authority, bewitch and embarrass the writer. Obviously assuming as a basic fact that which is no fact at all, namely, that governments are composed of the wisest, the most enlightened, the most unselfish members of the community, we are again goaded with the idea that the State must superintend every matter connected with medical education. Wanted immediately, a Medical Circumlocution Office, with an inferior descendant of the Tite Barnacles for the president, a young Barnacle for the secretary, a nephew Barnacle for the clerk, and a medical council composed of the highest talent, for performing the important duties of dummies. But, on hypothetical grounds (for practical men would not entertain the question), what should the Medical Circumlocution Office do? First it should give its license to practise to all whose preliminary general and medical education is proved to be sound, and whose moral character and habits are in keeping with the requirements of the profession. This, as regards protection of medical men, is the extent to which protection should be carried. At the same time the State, or rather the office aforesaid, should train and educate youths for medical and sanitary employments, "regulate the number of

admissions into the profession by the demand for medical employment", and signify the age at which our aspirants for medical practice should commence their practical career.

As regards the right of the State to interfere in these matters, our author advances one "conclusive and only unanswerable plea", namely, that THE SAFETY OF THE PEOPLE IS THE SUPREME LAW OF THE LAND. We grant this position; but who are to be the law-givers? to whom is the health of the people to be entrusted? to the people themselves, or to a small section of the people, in intellect not a hair's breadth above the educated community? Shall the will of this minority, simply because its objects are good, be absolute, though it kick at common sense, put fetters on liberty, and ignore those grand educational cravings by satisfying which men progress in peace?

The great evil of medicine now is, that she is over-legislated for; that she has more masters than she can obey; that some score or so of separate boards have not only the right to grant certificates for some form of practice or title, but have certain restrictive privileges, which they know well how to use. So far from more restrictions of this kind being imposed on medicine, she requires to be freely relieved of such heavy burdens, and to be permitted to stand in her own strength, untrammeled by supposed supports. Permit this freedom, and she is safe enough; but place her on the crutches of the State, let her never feel her own weight, or enjoy an unrestrained exercise, and, her limbs withering, she must become a hopeless State cripple, with a good clear head, of great use to mankind in general in a scientific way, but, as a political fact, a weak, hobbling, top-heavy body, to be looked down at by the parliamentarian, to be sneered at by the wig and gownsmen, to be laughed at by the mob.

We do not deny, however, that in the present confused state of medical affairs, order is required; and that a few simple and uniform rules, regulating the studies of students and of examination, are necessary. But from the profession itself these reforms must come; they must be shaped in accordance with the liberal and progressive spirit of the time; and they must in themselves proclaim silently, but convincingly, that there is in medicine a truth which, shunning no inquiry, and fearing no rivalry, proves its own worth.

On Sir Benjamin Hall's new Act for the better Local Management of the Metropolis, Mr. Rumsey hits mercilessly hard. Why are, he inquires, in this Act, the existing corps of sanitary officers, the medical attendants of the poor, left

unrecognised? As doctors differ, are these functionaries to get up lively discussions with the new officers of health on those controverted points of management which continually arise in a locality? Why have local boards, which know nothing about sanitary duties, the disposal of sanitary offices? Can the officer of a local board be independent? Will not the new plan give rise in the end to a modified "Tender System"? These are fair and reasonable questions; but, under any system whatever, would not other questions, quite as difficult to meet, spring up? It is not in the capacity of any two, or any fifty men to draw up a code for the guidance of other men, that shall be free from objections more or less heavy, or from blundering more or less foolish. Whatever act or deed is from man, is of man, takes from his mind its form, and is in itself an independency. But appeals it not also to minds equally independent, and of the which no two (so Nature rules) ever absolutely agree?

And here, indeed, is the difficulty and the perversity of most political suggestions—saving those that harmonise, educate, and urge, in the gentle and firm voice of humanity, the principles of self-trust and of confidence in nature—here is the difficulty, that the mind of man is an isolation; that no two men can agree; that no two epochs of men can be found which have agreed; that, to attain the same object, each man takes a different, an individual course.

For England an arbitrary system of State Medicine is impossible; there are not the legislators to conceive it or direct it. Grant as a fact the formation of such a system, in a comprehensive form, as its advocates say, and an *imperium in imperio* would be the upshot,—the physician-administrators of which might soon look out for the fate of their Roman prototypes—an universal dislike, and an expulsion from the community.

But what if an arbitrary system of State Medicine were consistent with the spirit and temper of the English people? Would it then do good, or advance the position of the nation? Impossible. An ignorant mass can never be governed into knowledge; a rigidly governed mass can never exist long, unless it be and continue ignorant. The science of politics, like that of chemistry, has its elements, which have their repulsions, their affinities, and their combinations. Concerning some of these it may be said that, while the union of ignorance and obedience is often slight, and the union of knowledge and rigid obedience is impossible, the union of independence and of knowledge is not only the firmest of all political

combinations, but supplies a radical principle, elementary in its characters, which neither the furnace of the bigot nor the hammer of the despot can separate or destroy.

In England we want no State Medicine. The very word is deadening in its import. If medicine, preventive and curative, cannot live as an educational fact, and as a simple guide to health, to wealth, to happiness; if she cannot appeal to the intellect, the reason, the senses, the conscience, then must medicine die; for, in the absence of these vital forces, no decoction of parchment, dispensed from St. Stephen's, can save her. The individual man, armed with the knowledge and with the genius for demonstration, requires no Act of Parliament to enforce his claims on the world. In the broad light of day, he lays his thoughts and his proofs before his fellow-men; and, if the proofs are convincing, and the thoughts good, they make their way, they stand alone; and, if they are of the best, they stand in the end where the best should—*first*. The same rule applies to men in their collective relations; the strength, the influence, of the mass is given in the unit.

In the other sciences this rule also holds supremacy. What would be thought of a State astronomy, or a State chemistry? The idea is monstrous. These sciences live by their own wits; why, then, should not medicine?

But can the State do nothing for medical science? It can; not, it is true, in the way of prompting it with anathemas and so-called rights, not by hugging it in its arms like an unhealthy infant, but by treating it as the representative of a vigorous manhood, requiring but encouragement to be able to sustain a high and useful position in the world. The State could mete out rewards and honours to discoveries in medical science; it could give to the distinguished in medicine a seat in its councils, and be all the healthier itself for the infusion; it could lend to medicine its great assistance in the collection of facts; it could increase the importance of the Registrar-General's Reports, by adding to the duties of that important functionary the additional duty of collecting statistics of disease; it could establish meteorological stations in various parts of the country; it could at times peremptorily remove any known and removable cause of disease; it could abolish one of its own glaring iniquities—the endorsement of the quack's poison with Her Majesty's seal; it could with advantage institute a law and medicine tribunal or board of reference, for its own guidance, in cases where life or health is concerned; and on the ministers of that tribunal it could confer its best honours.

These suggested modifications may not include all that are necessary, but they have the advantage of being all practical; and if they were fairly and simply explained and asked for, they could be obtained in time. But so long as men living in a world of their own go to our legislators, as if the legislators could themselves do what the nation will not hear of, and ask for the institution of a new power in the State, so long is it to be expected that what is called State Medicine will remain, in so far as Great Britain is concerned, a mere verbal curiosity, full of sound and energy, signifying nothing.

PARASITES OF THE ANIMAL BODY.*

Ordinary observation, as well as the researches of scientific men, have rendered familiar to us the fact, that certain animals assume different forms in different stages of their existence. Everyone, for instance, knows that the tadpole and the frog are in reality one and the same animal, and that the terms caterpillar, chrysalis, and butterfly, merely denote different stages of existence of the same being. But, besides these well known instances, naturalists have become aware of the circumstance, that certain of the lower forms of animal life, which were, when first noticed, believed to be distinct species and even genera, are in reality but transitional stages of animals, which may even be remarkably different from them both in external shape and in habits. Numerous examples of this have been found, for example, in the crustacea, or that tribe to which the crab and lobster belong.

Such researches as these in relation to disease may at first sight seem merely interesting—more fanciful than useful. But, in regard to one class especially of animal beings, the discovery of the fact that some of them are merely transitional forms of others, is likely to be of the greatest importance as indicating the means of preventing the recurrence of

---

* Von Siebold, Karl Theodor, Ueber die Band und Blasenwürmer, nebst einer Einleitung über die Entstehung der Eingeweidewürmer. (On Tape and Vesicular Worms: with an introduction on the Production of Intestinal Worms.) Leipzig: 1154.

Thomson, Allen, M.D., F.R.S., Notice of Recent Researches on the Origin of Entozoa, more especially of Tape-worms. In *Glasgow Medical Journal*, July 1855.

Barker, T. Herbert, M.D., On Cystic Entozoa in the Human Kidney. London: 1856. Hamilton.

Jordan, R. C. R., M.B., Lecture on the Entozoa. In *Association Medical Journal*, August 31, 1855.

a very common class of diseases. The demonstration of this fact will now be our task.

There is a well-known class of beings, of simple form, whose distinctive peculiarity is that they exist within or on the bodies of other animals. Hence they have received the name of *entozoa* (ἐντός, within; ζῶον, an animal) or parasites. In popular language, they are called intestinal worms. It may be remarked in passing, that some parasites, from their being attached to external parts, as the eyes of fishes, have received the name of *epizoa* (ἐπί, on; ζῶον, an animal); but this distinction is more artificial than natural, and, for all practical purposes in this place, it is sufficient to confine our remarks to the entozoa, or those animals which exist within the body.

The entozoa have been arranged, according to their forms, into four classes: 1. The cystic or bladder-shaped worms; 2. The cestoid or tapeworms; 3. The trematode worms; 4. The hematoid or thread-worms.

1. The *cystic* or bladder-shaped worms, also commonly called hydatids, are characterised by possessing a round (or nearly round) more or less transparent body, distended with fluid matter, and having a projecting part or head, surrounded by one or more rows of curved spines or hooklets —thus bearing some resemblance to a poppy-head. The most common animals of this group, with their ordinary places of habitation, are:

The *echinococcus hominis*, or liver hydatid, principally found in the liver of man, sometimes also in the kidneys, spleen, heart, brain, blood, or bones.

The *cysticercus cellulosæ*, usually found in the tissue between the muscles of man, also sometimes in the eyes, heart, liver, and other organs. It is frequent in the flesh of pigs, where it produces the disease called measles. The *cysticercus pisiformis*, or pea-shaped cysticercus, a small variety, inhabits the body of the rabbit. The *cysticercus fasciolaris* is found in the liver of the rat and mouse. The *cysticercus tenuicollis* inhabits domestic animals.

The *cænurus cerebralis* is ordinarily found in the brains of sheep, where it produces the disease termed "staggers."

2. The *cestoid* or tapeworms have the body composed of a number of segments jointed together, giving the appearance from which their popular name is derived. The head is furnished with a series of small mouths or suckers, and with a ring of hooklets, by which they are enabled to maintain their hold of the animal on which they live. The principal forms of cestoid worms are the following.

The *tænia solium*, or ordinary tapeworm, inhabits the human intestines, and is of frequent occurrence. The *tænia crassicollis* commonly dwells in the intestine of the cat. The *tænia serrata* infests the intestines of dogs.

The *bothriocephalus latus*, or broad tapeworm, occurs in the human body in eastern Germany, Russia, and Switzerland.

Certain other cestoid worms, known by the names of *rhynchobothrius* and *ligula*, are met with in fishes, and in sea-fowl and other animals which feed on them.

3. The *trematode* worms are represented by the *distoma hepaticum*, or common fluke, which inhabits the liver of sheep, producing the disease called "rot."

4. The *nematoid*, or thread-worms, so called from their small size, are represented by the following genera.

The common *ascaris* inhabits the lower part of the intestinal canal. Some ascarides, as the *ascaris incisa*, found in the peritoneal cavity of the mole, are enclosed in membranous cysts or bags.

The *filaria medinensis*, or Guinea-worm, is common in tropical countries, especially on the coast of Africa, and infests the tissue under the skin of the body, generally the leg.

It will be seen that the entozoa are found in two classes of situations: viz., in the surface of the alimentary canal, or in the interior of organs, as the liver, lungs, brain, heart, kidneys, blood, and beneath the skin, in the muscular tissue, etc. Of the two forms with which we principally have to deal here—the cystic and the cestoid worms—the former inhabit the interior of organs, while the latter attach themselves to the alimentary canal. This is an important fact to be remembered; for out of it has in a great degree grown the inquiry, whether these cystic and cestoid worms are really distinct from each other, or whether the cystic is merely an early stage of development of the cestoid. If the latter supposition be true, then the cystic worm can only become cestoid by being transferred to a suitable habitation; and one of the most obvious ways is, by being eaten in the flesh of the animal infected with it, and thus transferred to the alimentary canal of another animal. That this is what actually takes place, is what modern researches have proved.

The principal investigators of this subject have been Professor von Siebold of Munich; Eschricht of Copenhagen; Van Beneden; Küchenmeister of Zittau; Dujardin; Blanchard, as well as those other observers whose names are placed at the beginning of this article. The researches of Küchenmeister are of special interest and importance.

The main point which has been made out, and which has a most important bearing on public health, is this: that the cystic worms are but embryonic or early conditions of the cestoid; and that man and other animals, by eating meat in which cystic entozoa exist, are liable to become infested with cestoid or tape-worms. The condensed narrative of a few of the experiments which have been performed will show what this means.

1. Ten young dogs were fed by Von Siebold with the *cysticercus pisiformis* (or pea-shaped hydatid) from the rabbit. They were killed and opened at different successive periods afterwards, when the gradual process of the conversion of the cysticerci into tæniæ or tape-worms was observed in the intestines.

2. Six young dogs were fed with the *cysticercus tenuicollis*, which is common in domestic cattle. Dr. Von Siebold gave only the heads of the animals. The result was exactly the same as in the former case, tape-worms being developed, which reached their full development in forty-eight days.

3. Four young dogs had given to them at different times, in their food, the *cysticercus cellulosæ* from the flesh of the hog. On their being opened at different intervals afterwards, there were found in the intestines, in various stages of development, tape-worms which exactly resembled the *tænia serrata*. Von Siebold was struck with the close resemblance of the *tænia serrata* of dogs to the *tænia solium* of man, and believes that they are identical, or at most only varieties of the same species, the difference being dependent on their habitations.

4. A similar experiment was performed by Von Siebold with the heads of the *cœnurus cerebralis*, the entozoon which infests the brains of sheep and cattle, producing staggers. The dogs experimented on were carried to a part of the country where a number of the sheep were affected with sturdy. In the intestines of five out of seven dogs fed with the cœnurus, great numbers of tape-worms were found at successive periods, in different degrees of advancement.

5. Von Siebold gave to twelve young dogs and a fox quantities of echinococcus animalcules in milk. On their being examined at various periods, up to thirty-six days, there was found, in all stages of development, a small tape-worm, totally different from any described in the previous experiments, or indeed from any one hitherto accurately distinguished.

6. Dr. Küchenmeister, having previously caused the pro-

duction of the serrated tape-worm in the dog by feeding it with the *cœnurus cerebralis* from a sheep, gave to young lambs some of the joints of the tape-worm, with the effect of producing by the fifteenth day the usual symptoms of sturdy. The same results were obtained by Van Beneden at Louvain, Eschricht at Copenhagen, Leuckart at Giessen, and Haubner at Dresden.

6. Leuckart had in his possession a family of white mice, which he had employed for various experiments, and in none of which had the *cysticercus fasciolaris*, which infests the liver of these animals, been found. He gave to six out of twelve, with their food and drink, the ova of the *tænia crassicollis* or tape-worm of the cat. Four months afterwards he found, on opening these mice, that four of them were affected with the *cysticercus fasciolaris* of the liver; while in none of the mice which had not received the ova of tape-worm was there any trace of hydatids.

7. A most interesting experiment was performed by Dr. Küchenmeister, on a condemned criminal. He gave the man, at seven successive times, between a hundred and thirty and twelve hours previous to his execution, a number of *cysticerci* from the hog, and some from the rabbit, mingled with various articles of food. On examination after death, a number of young tape-worms, in different stages of development, were found in the intestine of the man.

8. Some experiments of Küchenmeister, Van Beneden, and Haubner, show that the *cysticercus cellulosæ* may be produced in great quantity in hogs by feeding these animals with joints of the common tape-worm of man; but that this does not occur in the dog or sheep. The experiments of Küchenmeister further tend to show that each form of hydatid—*cysticercus*, *cœnurus*, or *echinococcus*—produces its own form of tape-worm, and no other; and *vice versâ*.

9. M. Van Beneden brought up two newly-born puppies under the same conditions, except that to one of them a certain number of *cysticerci* were administered in his food, while these worms were carefully kept from the second. The *cysticerci* were administered on March 12 and 23, and on April 21. These dogs were killed and opened on April 25, when the animal which had eaten no *cysticerci* was quite free from the *tænia serrata;* while the intestines of the other dog contained three bundles of worms, which were considered to be the *tænia serrata*. M. Van Beneden has repeated experiments of this kind a number of times with the same results.

10. The interesting case narrated by Dr. Barker of Bedford,

in the paper the title of which is placed at the beginning of this article, was that of a patient, in whom quantities of *echinococci* used to escape from his body with the renal secretion. On inquiring into the nature of this man's food, Dr. Barker obtained the following interesting information:—

"For some years past he has rarely eaten either beef or mutton, having a natural aversion to these meats, and for one year, six years ago, he was a vegetarian. As an ordinary rule, however, he has lived on pork, and thinks that, on an average, he has taken 'pig's fry', consisting principally of the liver, at least twice weekly. He has on more than one occasion eaten 'measly' pork, and pig's chitterlings (the intestines of the animal) has been a frequent dish. He is also very fond of sheep's head, and especially of the brains, but does not know whether the brains he has thus taken were those of 'sturdy' sheep. He has likewise been accustomed to take in the morning herbal bitters, such as decoctions of horehound, wormwood, and agrimony. He is fond of coarse brown sugar. He does not remember ever having eaten meats badly cooked, and has not suffered from other forms of entozoa, except ascarides, which troubled him greatly in early life. His wife (since their marriage) has lived on the same diet, but has not shown symptoms of the same disease."

11. In the instance of a woman, in many respects similar to the case just referred to, Mr. Evans, of St. Neot's, gave Dr. Barker the following information with regard to the food of the patient:—

"In regard to diet, I have ascertained from my patient, that, about seventeen years since, she, as well as the whole of the family, were much in the habit of eating pig's brains in large quantity, as well as occasionally pig's fry; but that, since her first symptoms of disorder, now ten years ago, she has lived principally on mutton. The statement she made was, that her father, being a waggoner, was in the habit of bringing home large pigs' heads. Her mother usually put the brains into a pudding with seasoning, to constitute a meal for the family, and they individually ate heartily of it. No other instance of hydatids were known in the family."

These experiments, which are but a few among many which have been performed, demonstrate that an entozoon resident in one animal is transmissible to the body of another by being administered with the food. Thus a cystic worm may produce a cestoid or tape-worm; and, on the other hand, a cestoid worm may give origin to a cystic. Further, it appears that any form is not produced indiscriminately

from another, but that each cystic has its own representative cestoid.

Cases of the kind narrated by Dr. Barker suggest the question—how is it that a person who has taken cystic worms in his food, sometimes has cystic worms—not cestoid—developed in his body? The answer to this appears to lie in the fact, that the mode of development of the entozoa is mainly dependent on the part of the body which they reach. Those entozoa which are merely attached to the intestinal canal become cestoid or tape-worms, while those which are confined in the structure of organs, as the liver, kidney, brain, etc., retain the cystic form.

An argument in favour of the connexion of the occurrence of tape-worm in the human body with the eating of uncooked meat, is afforded by the well known fact regarding the Abyssinians, who are currently reported to consume large quantities of raw meat, and in whom tape-worm is a common affection. It is to be hoped that investigations will be made into the amount and nature of entozoic disease to which animals in Abyssinia are subject.

Dr. Von Schleisner, in his *Medical Topography of Iceland,* informs us that the inhabitants of that country have long been suffering from an hydatid disease—the hydatids affecting the liver, peritoneum, and tissue under the skin. About one-sixth of the whole population is said to be affected by it. Professor Von Siebold believes it probable that this disease depends on the introduction of the ova of a tape-worm into the body; and that this arises from the immense quantity of dogs kept in Iceland for herding sheep and cattle. This question, however, is open to further investigation.

The demonstration of the communicability of entozoa from one animal to another is of great importance in regard to the preservation of health. The development of worms in the human body is always recognised as at least a troublesome disease, and often as one attended with considerable impairment of the physical powers of the patient. To meet this evil, we have been ransacking the stores of curative medicine; and purgatives, turpentine, pomegranate, kousso, fern oil, and other drugs without end, have had each their trial. But in this instance, as in others, "prevention is better than cure"; and it is to be trusted that the knowledge of such facts as we have related, supported as they are by the evidence of trustworthy observers, will lead to the exercise of a greater amount of care in regard to the use of animal food. To the poor, who are accustomed to use those parts of animals most

liable to be infested with entozoa, and who are less careful than they ought to be in subjecting their meat to a sufficient culinary process, this information is second to none in a sanitary point of view.

A. Henry.

THE PHYSICAL EDUCATION OF WOMEN.*

The first work upon our list treats of those principles of physical and mental education which have since been widely popularised by Andrew and George Combe. Whatever may be thought of the special claims of phrenology to be regarded as a science, there is no doubt that the founders and promulgators of that system, which regards all mental and many physical operations as the result of certain conditions of the brain, introduced virtually a new element into medicine, and into many of the most knotty problems of social life. The divine and the poet may, indeed, consider that the works of Gall and Spurzheim, or the clear impressive *Constitution of Man,* omit to state fairly the mysteries of human life, and slur over rather than present any solution of "the riddle of the painful earth". But these works nevertheless introduce an immense body of facts and of insurmountable arguments, which have gradually worked into the thoughts of thinking men of all denominations and habits of mind, and which must henceforth form the basis of all philosophical systems, and of all practical legislation. Calvinists and Methodists are forced to recognise the importance of sanitary reform; Draco himself, had he lived in our day, must necessarily have paid attention to the limits of sanity, and to the intimate connexion between the asylum, the prison, and the gallows; and not the least among the triumphs of inductive science is that change in public opinion which has taken women out of the semi-angelic, semi-slavish, position which they once occupied in the ideas of the other sex, and reduced or exalted them to the level of a constituent part of the human race, with bodies and brains amenable to the same general laws as those of

---

* Spurzheim, J. C., M.D. A View of the Elementary Principles of Education, founded on the Study of the Nature of Man.

Blackwell, Elizabeth, M.D. The Laws of Life, with Special Reference to the Physical Education of Girls. New York.

Report of the Commissioner appointed to Inquire into the Condition of the Frame-Work Knitters. London: 1845.

Report of the Commissioner appointed to Inquire concerning Bleaching Works, etc. London: 1855.

men, and lying under the same stern necessity which declares "as thou sowest, so shalt thou reap". The fact having been gradually made clear to the majority of minds, that the fair and comparatively delicate frames of the "softer sex" are of the earth earthy, even as the flowers themselves, and bear the ordinary human relations to chemical and mechanical laws, it follows that exercise, cold bathing, loose healthy clothing, sound sleep, and a due measure of mental occupation, begin to be recognised as essential elements in the physical education of girls, whether they are considered as beings created for manifold use and enjoyment of their own natures, or simply in regard to the one physical duty which they owe to the next generation—that of bearing healthy children.

The excellent American work which comes second on our list, is the legitimate offspring of the school of thought to which the first belongs. Its author is of English birth, but was educated in America, and there conceived the desire to study medicine, regarding it as an eminently suitable branch of science for the attention and practical application of women. She took a regular medical degree at Geneva College, New York State, and coming to Europe, she spent some time in the hospital of La Maternité in Paris, after which she was permitted to study at St. Bartholomew's for some months, and then, returning to America, she commenced practice in New York. Her progress has been slow but sure, and she is at the present time in possession of increasing confidence and respect, not only from female patients, but from men of ability and standing in New York, who have accepted both herself and her principle as a marked fact and a growing truth of the time.

The Laws of Life formed the matter of a series of lectures delivered to a class of ladies during the spring of 1852; they are presented as "outlines of truth, and as indications of the right method of education, rather than as a full discussion of the subject." The lectures are six in number, and are thus entitled: Introductory; General Laws; The Organic Life; The Related Life; Criticism; Reform.

In a small volume under two hundred pages, a philosophical rather than a detailed scientific view of the subject is alone possible; and the English reader may think that the importance of health is by this time a tolerably well established fact, and does not need enforcement by such a mass of argument and illustration. The key-note of the book is the simple deduction, that "the perfect state of the organic life, of digestion, nutrition, innervation, and all the secretions,

is the foundation stone of our ideal; and that we might as well attempt to build a marble edifice on rotten arches, as strive for perfection with a disordered stomach or weak nerves." But it needs very slight acquaintance with American literature, to detect the fact that the standard of robust health among the female part of the nation is very low, both in practice and in theory. Delicacy of frame is confounded with delicacy of nature—the one being supposed to be the outward expression of the other; and Elizabeth Blackwell says, that "there is no nation in the world where so earnest an attempt is made to cultivate the mind, with so complete a neglect of all the physical necessities of the child, as in the United States—and nowhere is the health of the women so feeble—and this weakness is on the increase." Her English reader, to whom such an assertion regarding the condition of the majority of the Anglo-Saxon race cannot be uninteresting or unimportant, may well ask himself whether English women, more robust and of healthier habits as they undoubtedly are, are as yet anything like up to the mark of a satisfactory physical development; and whether, in the great increase of intellectual cultivation, and the pursuit of various arts and professions by the sex, there is not much danger of serious evil arising from sedentary education and life? The school and the college give to the future lawyer or clergyman something like a firm basis of bodily strength; the cricket-ground, the boat-race, the pedestrian excursion, find no parallels in the early training of girls. If teachers possess the sense and the kindness to ensure active play in the open air to their little pupils, the stimulus ceases as soon as the days of tuition are over; and young things of sixteen or seventeen find themselves suddenly planted in the life of women, with no livelier exercise than a walk, or, at best, the dance in a heated ball-room, when they ought to be asleep. It is true that the practical difficulty of securing healthy exercise of various kinds to young women is not an easy thing in the present state of the world and of public opinion, but it is not impossible; and it must be done, or the physical evils incident to the class of women who are removed from the beneficial necessity of making beds and sweeping stairs, and whose high mental cultivation is every year increased and urged on by all that masters, emulation, and the ambition of parents can suggest, or by the requirements of professions in which they are forced to contend with men for the winning of daily bread, will in the end lead to utter degeneracy. It surely would not be impossible, for instance,

to arrange some kinds of gymnasia in all large towns, where young girls might find such exercise as would be suitable to their powers, and which might preserve to them for a few more years somewhat of the suppleness and activity of childhood.

Regarding the true physical powers of the female sex, the greatest errors prevail. The degree of healthy exercise possible and suitable to women and girls is, indeed, so far above what is usually imagined, that it is worth while to dwell upon a few facts of female labour as undertaken by the lower classes of women in England. The *Report* of the inquiry into the condition of the operatives engaged in bleaching works, speaks of women and boys working fourteen, fifteen, and sixteen hours a-day, and of "the pains in the limbs directly referrible to the many hours that they are on their feet, and to the almost constant and sometimes rapid movement required." The *Report* also enters into various details, suggests that the hours should be limited to ten, and, "considering the fatiguing nature of much of the work of other descriptions in which both females and boys are engaged in the English bleach-works, especially" recommends a longer period of rest at meals. Pitiful are the statements of some of the young girls; and one woman, who had worked for twenty years, speaks of the "little ones falling asleep standing to their work." She says, "We start at half-past six in the morning, and leave off at eleven at night. This has been going on for two years. On Friday night a set comes on at ten o'clock, and works till Saturday at five. The set that comes on Saturday morning at six works till Saturday night at twelve; they start again at one o'clock on Sunday night. This has been so for two years, all the time that I have been here. We have in this room nine women and twenty-one girls, nine of whom are under thirteen. All these work the same number of hours. All the girls are always complaining of their legs aching and their feet being sore, and some are frequently off from illness; there are always one or two off in consequence of long hours and working at night. I have talked to them many a time about the hours being shortened like the factories. They wish that time would come." We learn of the framework knitters that John Geary, of Ansted, thinks that "The thing is quite inconsistent with reason that a woman should ever work in a frame at all; it is too heavy and too laborious for any female to work in, though there is a difference in the strength of women as well as in that of men;" also that the hours are as long as those of men, and

generally from fifteen to eighteen, " very few less than fifteen, I should think." "'At what age do the young women commence working in the frames?'—'As soon as they can; the same age as boys, in a manner.'" And we learn on another page, that the peculiar characteristic of the stocking-frame, "of having escaped the propelling and invincible power of steam, has been ascribed to the fact that the varied movements of the body, hands, and legs, which are each called into action in the working of a stocking-frame, are all necessarily mainly regulated and guided by the eye."

Thus we find our women of the lower classes undergoing prolonged physical labour to an exhausting and utterly injurious degree, while the fine ladies of our upper ranks cannot walk five miles to save their useless and effeminate lives.

In a little work entitled *Health, Disease, and Longevity*, by Lionel John Beale, are some curious facts concerning extreme age in either sex; and we find record of a Mrs. Jones, of Cambridge workhouse, who died at the age of 125, enjoying her health and senses to the last; also of Mary Rogers, aged 118, who lived the last sixty years on vegetables. Mary Jenkins, 110, Clothworkers' almshouses, London, never had any illness, and died suddenly. Margaret Patten, 137, St. Margaret's workhouse, always enjoyed good health till a few days before death; in many years she chiefly subsisted on milk. Mary Wilkinson, 109, Ronaldkirk, York, when young, walked seven times to London and back; at the age of ninety, she buckled a keg of gin and a quantity of provisions on her back, and reached London in five days and three hours.

Here are examples, on the one side, of immense and harmful physical labour; on the other, of vigorous and long life; one proving directly, the others indirectly, how much exertion the female frame is capable of enduring, and how large might be the range of medium powers, were due attention paid to the physical education of the sex. To this end it is necessary that all false ideals as to the constituent elements of real grace and beauty of womanhood be exploded. They lie at the root of much of that enervated habit of life which has lowered the whole physical tone of the women of the United States; nor is Europe free from a tinge of the Chinese feeling, which desires to see a beautiful woman "as a swaying willow". The world is not willing to trust to the inherent softness and delicacy (we use the word in an artistic sense) of a woman's person, and has an idea that the natural lilies and roses of a lovely complexion are rendered daintier

by sedentary habits and careful seclusion from the air. It will not recognise the artistic truth that the supreme beauty of anything, tree, flower, animal or human creature, can only consist with its perfect development; that the finish of Nature is infinitely more elaborate than the extremest finish of art. Once admitted, this law would sweep to the winds all those efforts to improve nature and gild refined gold, which are nowhere so absurd as when they interpose to mar the noblest work of Nature, by stays, tight shoes, false hair for the matron's brow, and cosmetics to imitate the inimitable hues of girlhood. Nature herself secures her own unities of time and place; confounds not the characteristic graces of different ages and different conditions. Art plays tricks with each essential charm of youth and age, and sacrifices in the struggle even more than beauty—the natural vigour of good health. Could mankind once be induced to trust wholly to the perfection of nature, a totally new system of physical education for the female sex would prevail. "Till then", to conclude in the expressive language of Spurzheim, "education will produce comparatively little effect. Man is the disciple of Nature, and he must submit to the determined sway which prevails in her government. He must submit himself to her; for he errs the moment he ceases to observe and begins to excogitate. The construction of a system of education cannot be a creative but an imitative process, which must be founded only on the lessons of experience. Here, as in the cultivation of every other science, it is not by the exercise of a sublime and speculative ingenuity that man arrives at truth, but it is by letting himself down to simple observation,—by rejecting equally the authority of antiquity and of eminent contemporaries, when in opposition to nature; by sacrificing every consideration that opposes the evidence of observation, and its legitimate and well-established conclusions; by being able to renounce all the favourite opinions of infancy, the moment that truth demands the sacrifice; in short, by following only the lights of observation and induction."

LORD BACON'S SANITARY PHILOSOPHY.*

THERE are no passages in the writings of the father of the inductive philosophy, which point out more strikingly the extent of his genius, his penetration, and his singular originality of thought, than those which convey his ideas as to the end, value, and meaning of sound instruction on the subjects of life, health, and disease. A few extracts from the Baconian philosophy bearing on these points, and remarkable for their terseness and deep insight of nature, cannot but prove acceptable to the sanitary reader.

The Regimen of Health.

"There is a wisdom beyond the rule of physic—a man's own observation; what he finds good and what he finds hurtful, is the best physic to preserve health."

"Beware of sudden change in any great point of diet, and, if necessity enforce it, fit the rest to it; for it is a secret both in nature and the state, that it is safer to change many things than one."

"To be free minded and cheerfully disposed at hours of meat, and of sleep, and of exercise, is one of the best precepts of long lasting."

"Entertain hopes, mirth rather than joy, variety of delights rather than surfeit of them; novelties; studies that fill the mind with splendid and illustrious objects, as histories, fables, and contemplations of nature."

"In sickness, respect health principally; in health, action."

"Physicians are some of them so pleasing and conformable to the humour of the patient, that they press not the true cure of the disease; and some others are so regular in proceeding according to art for the disease, that they respect not sufficiently the condition of the patient. Take one of a middle temper."

Death.

"I have often thought upon death, and I find it the least of all evils. All that which is past is as a dream; and he that hopes or depends upon time coming, dreams waking. So much of our life as we have discovered is already dead; and all those hours which we share, even from the breasts of our mothers, until we return to our grandmother the earth, are part of our dying days, whereof even this is one, and

* The Works of Lord Bacon; Latin and English editions. In Sixteen Volumes. By BASIL MONTAGU, Esq. London: 1834.

those that succeed are of the same nature, for we die daily; and as others have given place to us, so we must in the end give way to others.

"I know many wise men that fear to die; for the change is bitter, and flesh would refuse to prove it: besides, the expectation brings terror, and that exceeds the evil. But I do not believe that any man fears to be dead, but only the stroke of death; and such are my hopes, that if heaven be pleased, and nature renew but my lease for twenty-one years more, without asking longer days, I shall be strong enough to acknowledge without mourning, that I was begotten mortal. Virtue walks not in the highway, though she go *per alta;* this is strength and the blood to virtue, to contemn things that be desired, and to neglect that which is feared.

"In my own thoughts, I cannot compare men more fitly to anything than to the Indian fig-tree, which, being ripened to his full height, is said to decline his branches down to the earth, whereof she conceives again, and they become roots in their own stock. So man, having derived his being from the earth, first lives the life of a tree, drawing his nourishment as a plant; and made ripe for death, he tends downwards, and is sowed again in his mother the earth, where he perisheth not, but expects a quickening.

"So we see death exempts not a man from being, but only presents an alteration; yet there are some men (I think) that stand otherwise persuaded. Death finds not a worse friend than an alderman, to whose door I never knew him welcome; but he is an importunate guest, and will not be said nay."

Building.

"Houses are built to live in, and not to look on; therefore let use be preferred before uniformity; except where both may be had. Leave the goodly fabrics of houses, for beauty only, to the enchanted palaces of the poets, who build them with small cost. He that builds a fair house upon an ill seat, committeth himself to prison: neither do I reckon it an ill seat only where the air is unwholesome, but likewise where the air is unequal; as you shall see many fine seats set upon a knap of ground, environed with higher hills round about it, whereby the heat of the sun is pent in, and the wind gathereth as in troughs; so as you shall have, and that suddenly, as great diversity of heat and cold as if you dwelt in several places. Neither is it ill air only that maketh an ill seat; but ill ways, ill markets, and, if you will consult with Momus, ill neighbours. I speak not of many more;

want of water, want of wood, shade, and shelter, want of fruitfulness, and mixture of grounds of several natures; want of prospect, want of level grounds, want of places at some near distance for sports of hunting, hawking, and races; too near the sea; too remote; having the commodity of navigable rivers, or the discommodity of their overflowing; too far off from great cities, which may hinder business; or too near them, which lurcheth all provisions, and maketh everything dear; where a man hath a great living laid together; and where he is scanted."

Medicine, Curative and Preventive.

"We divide medicine into three parts, or offices: viz., 1st, the preservation of health; 2nd, the cure of diseases; and 3rd, the prolongation of life. For this last part, physicians seem to think it no capital part of medicine, but confound it with the other two; as supposing, that if diseases be prevented, or cured after invasion, long life must follow of course. But, then, they do not consider that both preservation and cure regard only diseases, and such prolongation of life as is intercepted by them: whence the means of spinning out the full thread of life, or preventing, for a season, that kind of death which gradually steals upon the body by simple resolution, and the wasting of age, is a subject that no physician has treated suitably to its merit."

"A work is wanting upon the cures of reputed incurable diseases, that physicians of eminence and resolution may be encouraged and excited to pursue this matter as far as the nature of things will permit; since to pronounce diseases incurable, is to establish negligence and carelessness, as it were by a law, and screen ignorance from reproach."

"To see the daily labours of physicians in their visits, consultations, and prescriptions, one would think that they diligently pursued the cure, and went directly in a certain beaten track about it; but whoever looks attentively into their prescriptions and directions, will find, that the most of what they do is full of uncertainty, wavering, and irresolution, without any certain view or foreknowledge of the course of the cure. Whereas they should from the first, after having fully and perfectly discovered the disease, choose and resolve upon some regular process or series of cure, and not depart from it without sufficient reason."

"And these are the things wanting in the doctrine of medicine for the cure of diseases; but there still remains one thing more, and of greater use than all the rest: viz., a

genuine and active natural philosophy, whereon to build the science of physic."

"Things seem to us preservable either in their own substance or by repair; in their own substance, as a fly, or an ant, in amber; a flower, an apple, etc., in conservatories of snow; or a corps of balsam; by repair, as in flame and mechanic engines. He who attempts to prolong life, must practise both these methods together; for separate, their force is less. The human body must be preserved as bodies inanimate are; again, as flame; and lastly, in some measure as machines are preserved. There are, therefore, three intentions for the prolongation of life: viz., 1, to hinder waste; 2, secure a good repair; and 3, to renew what begins to decay."

Artificial Medicinal Baths and Springs.

"And for the preparation of medicines; it seems strange, especially as mineral ones have been so celebrated by chemists, though safer for external than internal use, that nobody hath hitherto attempted any artificial imitations of natural baths and medicinal springs, whilst it is acknowledged that these receive their virtues from the mineral veins through which they pass; and especially since human industry can, by certain separations, discover with what kind of minerals such waters are impregnated, as whether by sulphur, vitriol, iron, etc. And if these natural impregnations of waters are reducible to artificial compositions, it would then be in the power of art to make more kinds of them occasionally, and at the same time to regulate their temperature at pleasure. This part therefore of medicine, concerning the artificial imitation of natural baths and springs, we set down as deficient, and recommend as an easy as well as useful undertaking."

Winter and Summer Sickness.

"It is commonly seen that more are sick in the summer and more die in the winter, except it be in pestilent diseases, which commonly reign in summer or autumn. The reason is, because diseases are bred chiefly by heat, but then they are cured most by sweat and purge, which in the summer cometh on or is provoked more easily. As for the pestilent diseases, the reason why most die of them in the summer is, because they are bred most in the summer; for otherwise those that are touched are in most danger in the winter."

Pestilential Seasons. Epidemics.

"The general opinion is, that years hot and moist are most

pestilent; upon the superficial ground that heat and moisture cause putrefaction. In England it is not found true, for there have been great plagues in dry years. Drought tainteth the waters commonly, and maketh them unwholesome."

"Many diseases, epidemical and others, break out at particular times, and the cause is falsely imputed to the constitution of the air at that time when they break forth or reign, whereas it proceedeth indeed from a preceding sequence and series of the seasons of the year; and therefore Hippocrates in his prognostics doth make good observation upon the diseases that ensue upon the nature of the precedent four seasons of the year."

Of Drinking Waters.

"Judgment may be made of waters by the soil whereupon the water runneth; as pebble is the cleanest and best tasted; and next to that clay water; and thirdly, water upon chalk; fourthly, water upon sand; and, worst of all, upon mud. You may not trust waters that taste sweet, for they are commonly found in rising grounds of great cities, which must needs take in a great amount of filth."

The Basis of Sanitary Inquiries.

The rules of the author of the inductive philosophy on the nature of sanitary duties possess great interest at the present time. For the benefit of "officers of health" everywhere, we shall give some of these rules a free transcription.*

"Inquire diligently of dessication, aerifaction, and consumption of bodies inanimate, and of vegetables, and the ways and processes by which they are done; also of the recovery of bodies to their former freshness after they be once dried and withered. From the inquisition touching bodies inanimate and vegetables, let it pass on to other living creatures besides man.

"Inquire touching the length and shortness of life, with the due circumstances which make most for their long or short lives.

"Inquire touching the length and shortness of life in men according to the ages of the world, the several regions, climates, and places of their nativity and habitation.

"Inquire touching the length and shortness of life in man,

* For some excellent remarks on this subject, see Mr. RUMSEY'S Essays on State Medicine.

according to their races or families, as if it were a thing hereditary; also according to their complexions, constitutions, and habits, their statures, the manner and time of their growth, and the making and composition of their members.

"Inquire touching the length and shortness of life in men, according to the times of their nativity, not astrologically, but as whether they were born in the 7th, 8th, 9th, or 10th months; also whether by night or by day, and in what month of the year.

"Inquire touching the length and shortness of life in men, according to their face, diet, government of their life, exercises, and the like.

"Inquire touching the length and shortness of life in men, according to their studies, their several courses of life, the affections of the mind, and divers accidents befalling them.

"Inquire apart touching those medicines which are thought to prolong life.

"Inquire touching the signs and prognostics of long and short life, those which may be seen and observed even in health, whether they be physiognomical signs or any other.

"Inquire touching those things which conserve the body of man from arefaction and consumption, at least which put off and protract the inclination thereto.

"Inquire touching those things which pertain to the whole process of alimentation (by which the body of man is repaired), that it may be good and with the best improvement.

"Inquire touching those things which purge out old matter and supply with new.

"Inquire touching the point of death, and the porches of death leading thereunto from all parts, so that death be caused by a decay of nature and not by violence.

"To know the character and form of old age, make a collection of all the differences both in the state and functions of the body, betwixt youth and old age, that by them you may observe what it is that produceth such manifold effects; let not this inquisition be omitted.

"Inquire diligently touching the differences in the state of the body, and faculties of the mind in youth and old age; and whether there be any that remain the same without alteration or abatement in old age."

Such are some of the advices of Lord Bacon to sanitary and medical inquirers. They are better left free of all comment. Whoever reading them shall rise uninstructed, or shall feel cheated out of time, has full liberty to blame the transcriber for his pains.

THE EPITOME OF SANITARY LITERATURE.

DEFECTIVE VENTILATION OF HOSPITALS.*

NOT long ago, says Mr. Roberton, I had occasion to inspect the dormitories in a school, in each of which fourteen boys had for some time slept, with a cubic air-space for each boy of barely 140 feet. Ere long the ill effects appeared; seven of the boys and two of the masters sickened of typhus, and the school had for a time to be broken up.

Dr. Mackinnon, in his work on the *Public Health of Bengal*, published in 1848, states that the number of prisoners in the gaols is usually about 40,000, chiefly natives; the average mortality annually of these had recently been one in ten, rising in some instances to more than one in four, viz., to 26 per cent. This rate of mortality is accounted for, on the fact that in no instance is there an allowance of more than 300 cubic feet of space for each individual, whilst in some instances 70 cubic feet is the "murderous" average. From 800 to 1,000 cubic feet is the smallest possible amount of air for one individual; with this calculation we entirely concur.

As regards the construction of hospitals for the sick and wounded, Mr. Roberton makes a remark—a most common-sense and original remark. "We have been," he says, "in the habit of confounding two things widely different, viz., sick wards and dormitories. It is owing to ignorance or inattention to this essential difference that we have few hospitals in England that are not insalubrious whenever they are crowded; and which, when crowded with such cases as burns, compound fractures, and extensive ulcers, are often the abodes of deaths occurring in forms most humbling and mortifying to the pride of surgical science. The air-space for each bed in a number of our provincial hospitals is not half what it should be."

Another defect to which Mr. Roberton refers with great force is, that in English hospitals there are no arrangements to prevent the foul air of one ward from becoming diffused over the whole of the building—thus polluting the whole. On the continent, however, this all important preventive process is attained in many instances, but in none so completely as in the *Hospital of Bordeaux*.

The construction of the Bordeaux hospital is simple, effec-

* On the Defects with reference to the Plan of Construction and Ventilation of most of our Hospitals for the reception of the Sick and Wounded. By JOHN ROBERTON, Surgeon. Manchester: 1856.

tive, elegant. Its main advantage is, that no single ward communicates with another one. Passing into the hospital by the centre gateway, the visitor beholds a beautiful court, and on the two sides facing each other a succession of pavillions or tiers of building, standing parallel and having the ends towards the square. The tiers of building are separated from each other by a neat and elegant garden, and in these tiers are the sick wards of the place, each isolated and independent.

Each ward is about 140 feet long, 30 feet wide, and 20 feet high. It has tall narrow windows on each side, facing the opposite ward, and contains thirty-eight beds, nineteen in a row. The bedsteads, small and of iron, are hung round with dimity curtains, but are without the tester. Free ventilation is secured through the windows, and the look out on either side is into a beautiful garden, fifty feet broad. The ward has only one door, which serves both for entrance and for exit, and this leads into the open air. The wards in the upper stories are reached by a staircase without. Thus every ward is in fact a separate hospital, and the foul air from the one cannot enter into the other, because it passes direct into the *external* atmosphere and is there diffused.

A peculiar advantage connected with this arrangement is, that there is no limit to the size of the hospital or the number of beds. In England, the larger the hospital is, the higher is the rate of mortality, because the construction is after the manner of an hotel, with each room subjected to the influence of the air of the other rooms. In the Bordeaux hospital there are 728 beds.

On the subject of ventilation, Mr. Roberton remarks that he has little faith in so-called "scientific ventilation." "I should almost as soon think," he tells us, "of looking for my daily supply of water for ablution from the scientific formation of it out of its aeriform elements by galvanic agency, as upon depending upon such refined expedients for the purity of the sick ward. If a ward is to be kept perfectly sweet, the air must flow through it in correspondence with the natural movements of the atmosphere without. Let the windows of the opposite side walls (they ought to reach near to the ceiling) be thrown open, and instantly the air enters at one side and escapes at the other, the side of admission being determined by the direction of the wind at the time. There is an unceasing flow of the atmosphere, mostly parallel to the surface of the earth, which fans and purifies everything. A perfectly stagnant condition of the atmosphere—if it ever

exist—is extremely rare." Curious and refined modes of ventilation therefore, says this writer, fail when applied to a hospital, the effluvia of which can be dissipated by no ventilation other than nature's—the ceaseless, it may be imperceptible, flow of the external air through the wards.

We gather from the rest of Mr. Roberton's Treatise, which, like all his writings, is remarkable for clear common sense and fearless expression of the truth, the following rules.

The windows of hospital walls should be "tall;" they should approach the ceiling.

The annoyance of "draughts" may be prevented by admitting the air current through perforated zinc.

Beyond fireplaces and open stoves, artificial modes of heating are injurious. Heat promotes the decomposition of the excretions; and we cannot increase the discomfort of patients more than by surrounding them with an unnaturally dry, hot atmosphere.

In every ward there should be a discharging shaft in the wall, shut by a sliding cover, by which soiled clothes, fouled dressings, and the like, may be removed at once to the wash cellar.

The ceiling and walls should be painted and highly varnished, so that they do not imbibe effluvia.

There should be no unnecessary furniture in the ward.

There should be a separate eating room for convalescents.

There should be every attention paid to cleanliness, not only of the ward itself, but of the persons of the patients and their attendants.

The site of a hospital ought to be an elevation to the windward of a city; on a soil naturally dry, or admitting of easy drainage; while the plot of ground ought to be large enough to include gardens, not merely to please the eye of the sick, but to provide as well the means of recreation and exercise for convalescents.

There should be accident rooms in the streets of all our larger towns as there are in Paris, where sufferers may be conveyed and promptly attended to, instead of their being removed, it may be, to a remote hospital before the wound is dressed, the dislocation reduced, or the broken bone adjusted.

CHOLERA IN OXFORD.*

Dr. Acland has presented to the public a very hand-

---

* Memoir of the Cholera in Oxford in the Year 1854. By H. Wentworth Acland, M.D., F.R.S. London: Churchill. 1856.

some classical and interesting work, which will deserve well to be referred to at greater length on another occasion.

The conclusions at which he arrives as to the causes of cholera, are:

Diarrhœa always co-exists with cholera in any given locality, and is not communicated from person to person.

Cholera may arise without the suspicion of contagion.

Cholera may certainly be conveyed from place to place by human agency.

It can scarcely be longer doubted that the evacuations of cholera patients are capable of communicating the cholera.

It is quite certain that in the majority of cases the cholera evacuations do not communicate the cholera.

It is quite certain that in localities apparently exceedingly prone to the development of cholera, cholera which is imported to them may not be propagated.

The poison of the evacuations (of cholera patients) may be conveyed through the air or by the agency of water; therefore poisoned water, though one means of spreading the disease, is not the only means.

Crowded dwellings and imperfect ventilation are dangerous in the highest degree during the prevalence of a cholera atmosphere.

A low scale of diet favours diarrhœa; a better diet tends to check it.

THE MEDICAL SELECTION OF LIVES FOR ASSURANCE.*

Dr. Brinton gives some useful and excellent rules on this important practical subject. Pulmonary tubercle is dwelt on as the most objectionable feature in a case proposed for insurance. When, in addition to a consumptive father or mother, the applicant for insurance has also a consumptive brother or sister, the life should be declined. "The reformed drunkard is not a good life." A man who practises a sedentary occupation in a dark room is a bad life. Men who take a great deal of fatigue and of unrest are bad lives. In considering the build of a person, weight should be taken into account together with height. If the height be 66 inches, the average weight should be 140 lbs. avoirdupois. Twenty per cent., or one-fifth, is the maximum variation from this rule. Rapid or sudden variations in weight are always objectionable as indicating doubtful health.

Dr. Brinton's special experience leads him also to think,

* The Medical Selection of Lives for Assurance. By Wm. Brinton, M.D. London: Churchill. 1856.

that streaks of red bloodvessels (in which the vessels are marked out) on a pale cheek, are a sign of the disease of the kidney, which gives rise to albuminuria. Persons suffering from open ulcers and sores are bad lives. The spirometer is of great service in some cases. A healthy male, of from 15 to 50 years old, averaging 10 stone in weight and 66 inches in height, should show a vital capacity of about 200 inches. For every inch of height above or below 66 inches, and within the ranges of 60 and 72, eight and a half cubic inches in capacity may be subtracted or added, from or to every inch below or above the usual standard of height.

An intermittent pulse is a doubtful sign, and should receive in all cases an explanation.

KAFFIR DOCTORS.*

In most cases of illness amongst the Kaffirs, the doctors profess to extract from the bodies of their patients substances said to have been introduced into their bodies through witchcraft. Wood, rags, cowdung, and reptiles are said to be thus extracted.

Cases. 1. Chronic deafness; a boy; twigs extracted from the ear. 2. Ulceration in the heel; child; name Refene; had suffered for eighteen months; friends consulted various doctors, who extracted sticks, thorns, and chips, but without success. Sacrifice was recommended as a last resource. 3. Case of ulceration of the nose; a man; suffered for two years. Doctors extracted various substances, but no cure. 4. Acute catarrh; child; several doctors consulted; *they differed;* some said a serpent had licked the child's head in the night; others extracted a black substance from the forehead; no success.

These cases afterwards came under Dr. Bindon of the 6th regiment, who found them all amenable to simple treatment. Dr. Bindon has had under his care in Kaffirland the following diseases: fevers, eye-diseases, chronic skin-diseases, consumption, asthma, inflammation of the bowels and lungs, lumbago, gonorrhœa, chronic ulcers, snake-bites, boils, ulceration of the tongue and mouth, deafness, heart-disease, epilepsy, catarrh, club-foot, amentia, and some cases of accident. The Kaffirs submit readily to European medical treatment.

* Papers relative to the State of the Kaffir Tribes. Parliamentary Report, 1856.

THE DISEASES OF OVERFED CONVICTS.*

It is a most remarkable fact, and one that will long have record in English history, that at or about the time when our Crimean army of martyrs was suffering all the horrors of a *famine plague,* another body of Englishmen, not martyrs, but outcasts, on t'other side earth, were undergoing the miseries of what may be called a *gluttony plague.* Thus do extremes meet,—and so is there but one move from the sublime to the ridiculous.

Let us break the enigma. At the close of the year 1854, a period ever memorable in connexion with the starvation of our army, Dr. Rennie, a medical officer in the Queen's service, having charge of the convict establishment at Fremantle, in Western Australia, was busily occupied in drawing up an earnest and convincing report to his superior officer. His object was to prove that the bodies of the convicts placed under his care were—oh, inhuman thought! the victims of a system of Epicurean philosophy, so rigidly carried out, that for month after month the unhappy men, catching, as it were, an infection from the tables at which they—shall we say it? —crammed, groaned heavily under the weight of a perennial feast, such as few human lips have laboured at or human stomachs surfeited from.

On each side earth, in fact, at the same time, a grand physiological experiment was being unconsciously conducted. In the cold winter of the Crimea a band of heroes were suffering the horrors of starvation, coupled with overwork. In the warm and genial climate of Australia, a band of vagabonds were undergoing the miseries arising from a systematic process of *overfeeding,* coupled with deficiency of exertion. Destitution and luxury were each doing their worst work on the largest scale.

Content with recording this remarkable coincidence, we proceed to the narration of the *glattony plague* as described in Dr. Rennie's interesting and thoughtful report.

From the 1st of July, 1854, to 31st of December of the same year, there came under medical treatment at the convict establishment at Fremantle, 1,554 patients. Of these, the vast majority suffered from one or other of three classes of disease, viz., diseases of the digestive organs, inflammatory affections of the eyes, and cutaneous eruptions; they

* Further Correspondence on Convict Discipline and Transportation. Blue Book. London: 1856.

were all, in the opinion of Dr. Rennie, the results of over-feeding, assisted occasionally by a deficiency of vegetable acids. The amount of food daily supplied to each probation convict, was at the end of 1854 as follows. *Breakfast*, 12 oz. of bread, 1 pint of tea, with $\frac{3}{4}$ oz. of sugar and $\frac{1}{6}$ oz. of tea; total weight, 2 lbs. *Dinner*, 16 oz. of potatoes, 16 oz. of meat, 6 oz. of bread, $\frac{1}{2}$ oz. of salt, $\frac{1}{4}$ oz. of pepper, 1 pint of soup, and 1 oz. of rice, barley, or oatmeal for thickening the soup; total, 3 lbs. 10 oz. *Supper*, 8 oz. of bread, 1 pint of tea, as for breakfast; total, 1 lb. 12 oz. The total weight of food allowed per diem was thus seven pounds six ounces, including fifty-nine ounces of solid aliment; while to the blacksmiths and sawyers, an extra ration of 4 oz. of bread and 4 oz. of meat was given, bringing their diet up to 7 lbs. 14 oz., of which 67 oz. was solid aliment.

In support of his view, that upon the excess of diet the peculiar diseases to which the prisoners were subject were mainly dependent, Dr. Rennie offered the following reasonable proofs.

1. That prisoners who had been some time *re*-convicted, and, consequently, habituated to a lower scale of diet than the probation prisoners, enjoyed much the best health.

2. That probation prisoners, when temporarily placed on low diet, rapidly improved in general health.

3. That medicines, without a considerable reduction in diet, exercised little or no permanent influence over the ailments of the prisoners.

4. That after every species of treatment had failed in arresting dysentery, cutaneous diseases, and ophthalmia, especially the latter, a moderate and properly regulated diet, with a sufficiency of vegetable acid, speedily effected a cure.

5. That the want of vegetable acid in the diet, was proved by the temporary improvement which resulted from the free use of lime-juice, even when no reduction of diet took place, as in the out-door treatment of some cutaneous eruptions.

6. That, irrespective of the evidence furnished by the amount of disease, a comparison of the diet supplied to the convicts with that which is considered necessary in England for a man exposed to the ordinary vicissitudes of a labourer's life, was sufficient to prove how much the diet was in excess of what is either requisite or safe; the diet furnished to the probation prisoners exceeding by one pound, *after allowing for loss by cooking*, that which is calculated by competent authorities for a labouring man in England; and this excess being also supplied in a climate where the chemical demands

of the system for food are much less, and where an over supply must, from physical laws, end in the production of functional, and its natural sequence, organic disease.

7. That the extraordinary prevalence of constipation, a prevalence altogether inconsistent with health, was a strong proof that the diet exceeded the systemic demands for food.

8. That the diseases so prevalent amongst the prisoners were almost entirely unknown amongst the troops, the pensioners, many of whom were debilitated from long service, and the population generally in Fremantle, although these classes were exposed to the same exciting causes as the prisoners were, save and except in the matter of diet.

9. That in the medical treatment of the convicts nothing succeeded so well as the administration of purgative medicines in doses enormously large (say five drops of croton oil or sixty grains of jalap); that, under such medical influence, the quantity of alvine matter thrown off was sometimes incredible, amounting, in one case, to not less than thirty pounds; and that this excrete was always more or less in a state of decomposition or fermentation.

Such were some of the positive proofs in support of his theory brought forward by Dr. Rennie; but he went a step further. He showed that there was an absence of other causes. He pointed out that the atmosphere was pure; that the general locality of Fremantle was favourable to health, and that the diseases prevailing amongst the prisoners were altogether unknown amongst the community generally; that the site of the establishment was good; that, as the convicts during their daily labour were exposed to the same external agencies as the sappers and miners, warders, and free mechanics, all of whom escaped from the convicts' diseases, a miasmatic influence could not be entertained as an exciting cause; that the wards of the convict establishment were well ventilated, being in this respect much superior to the wards of the barracks where the soldiers were lodged; that there was no evidence of the diseases named having spread by contagion, the orderlies of the hospital all having good health: that the water supply was excellent; that, in fact, reduction to punishment diet of bread and water for some days effected a cure; that moral depression, from the position of the men as prisoners, was removed out of the field of argument, by the circumstance that 80 per cent. of them were better off than they ever were in their lives before, while those most exposed to such depressing influences, viz., those under solitary confinement with reduced diet, enjoyed

L 2

perfect immunity from the diseases in question, and had far better health than the rest of the prisoners.

Having thus, both by affirmative and negative evidence, proved his position, Dr. Rennie proceeded to point out that the type of the diseases to which he specially referred, was of a scrofulous or gouty character, resulting from disordered digestion and from an amount of overwork thrown on the natural excreting organs; and ultimately he begged, for the physical security of his convict excellencies, that their provender may be reduced to the following modest scale:—

Breakfast.	*Dinner.*	*Supper.*
10 oz. of bread.	12 oz. of meat.	8 oz. of bread.
1 pint of tea.	1 lb. of potatoes.	1 pint of tea.

That is to say, that their solid food might be reduced to forty-six ounces a day; a scale ten ounces above what is required in England for the complete nourishment of a labouring man working twelve hours a day, and in a climate requiring a greater proportion of food.

In the conclusion of his Report, Dr. Rennie drew attention to the fact, that an abundance of excellent fish exists in the waters about Fremantle, and suggested that the prisoners should be employed in catching them. "Thus", says he innocently enough, "the prisoners would to a certain extent diminish the cost of their support;" and a large gang of men might find employment, "who, from long continued indigestion, have become quite unfit for any labour entailing much physical exertion, and to find employment for whom is a constant source of difficulty to the superintendent."

The same class of men abounds also at the depôts, where, if no scope is allowed them for piscatorial pursuits, they might be employed in manufacturing arrowroot from the zamia plant. "The process is simple, and the farina procured equal to the best kinds of Indian arrowroot. At Freshwater Bay depôt, the men *amuse themselves* in the evening making it, fourteen pounds of the central portion of the root making a pound and a quarter of arrowroot in three or four hours." Indeed, unbounded resources exist; and the encouragement of the manufacture of arrowroot at the depôts might develope amongst the prisoners a mode of earning their livelihood, and lead to the establishment of a new and important article of commerce and export.

According to Dr. Rennie, the saving to the crown which would arise from reducing the diet roll to the scale he suggested, would amount to at least £10,000 per annum.

But it was in a physiological point of view that the ques-

tion required to be most carefully reviewed. With great care and ability our author analysed the well considered arguments of Dr. Andrew Combe and Sir James Clark on the subject of digestion. He showed that the evils of overeating are virtually the same and nearly as serious as those of privation; that there is a limit to the powers of the natural secreting and excreting organs; that under an excess of overwork these organs cease to act in great part; and that upon this, various derangements, amongst which dyspepsia is the prominent one, inevitably stand forth.

Dr. Combe, in his *Physiology of Digestion*, remarks specially on a symptom of gnawing sensation in the stomach and craving for more food, which is so common an indication of irritable stomach and indigestion arising from overfeeding.

With cases of this character, the Fremantle convict establishment seems to have been overflowing prior to the appearance of the report now in hand; and Dr. Rennie records many striking examples of this kind. We will sketch out one only. On the 16th of February, 1854, a convict named John Hudson, register number 3,035, was admitted into hospital labouring under an aggravated form of indigestion, characterised by great uneasiness in the stomach, cough, and difficulty in swallowing. On examination, the throat and gullet were found in a state of chronic inflammation, and throwing off a profuse purulent discharge. On visiting the infirmary at noon on the day of his admission, Dr. Rennie found Mr. Hudson comfortably ensconced behind the following trifling repast,—nine ounces of solid meat, eight ounces of bread, twenty-one ounces of potatoes and cabbage, with one pint of soup thickened with oatmeal, and weighing twenty ounces; thus completing arrangements for the taxation of a grossly disordered stomach, to the extent of fifty-eight ounces of food, at one inevitable go. If to this collation breakfast and supper sustenance be added, it follows that Mr. Hudson was consuming daily seven pounds of food, a proportion, if his absolute weight amounted to twelve stones or one hundred and sixty-eight pounds, equivalent to a twenty-fourth part of his whole body. Granting also for something considerable in the way of loss, it would follow further, that if this gentleman's assimilating and wasting powers had been commensurate with his reception faculties, he would virtually have exchanged the elements of his body and have assumed an entire new corporeal development every lunar month at least; a calculation upon which an original mode of reforming criminals might possibly

be based, could the mental constitution be made, by some apposite discovery, to change *pari passu* with the physical. This latter point commands respectful consideration. Unfortunately, however, in the present case, even the physical waste of our victim would not run on in proportion to his supplies; so he came under medical care, and, in spite of his strongest remonstrances, which showed the decision of his character, he was put on low diet and soon recovered.

And now the reader will naturally ask, Why are convicts thus over replenished? The answer is, that the authorities find that a body of men are more easily managed when well clad, well lodged, and supplied with more food than will satisfy their animal cravings. Treated on this principle, they can readily be punished by the withdrawal of their luxuries. This is the only argument. Whether it is a justifiable mode of attaining the object in view, opens, says Governor Kennedy, "a most serious question."—Serious, indeed, after Dr. Rennie's clear and plain-spoken revelations.

The report of Dr. Rennie met with some opposition from his superior, Dr. Galbraith, who evidently has no leanings to common sense physiological deductions. However, in the establishment at Fremantle, the main point was ultimately carried. The diet allowance was lowered; and a second report, bearing date June 30, 1855, states that the reduced diet, though still capable of further reduction, answered well, and that the hospital records afforded convincing proofs that a very great change for the better in the general health of the ticket of leave men and the prisoners had taken place, since the reduced ration had been in operation.

In a sanitary as well as in a political point of view, the value of such facts as are above recorded cannot be over estimated. In the world at large we see too frequently what the effects of starvation are on a comprehensive scale; but it is a novelty, both in physiology and pathology, to get a wholesale view of the effects of over repletion from one continued form of diet. A modern Magendie, wishing to investigate further into the subject of the food elements that build up, and the food elements that keep the animal fire alive, need sacrifice no more unhappy dogs at the shrine of Æsculapius. Let him but read in English blue books how, with an eye to the progress of physiological science, our authorities overfeed, underfeed, and don't feed at all, their convicts, their fighting men, and their paupers; and he will find sufficient facts ready made to afford him full occupation in arrangement and deduction for five years at least.

ORIGINAL COMMUNICATIONS.

NURSERY GOVERNMENT IN ITS SANITARY ASPECTS.

By T. HERBERT BARKER, M.D., F.R.C.S.

(*Continued from p.* 58.)

Proper Diet of Infancy. It might be supposed that every parent and every nurse would understand that the best nutriment for the babe is that supplied by the maternal breast; but medical interference is often required to enforce this simple truth, to explain its full importance, to show the difficulty of finding a good substitute for the natural diet, or to reprove the errors or unworthy motives that would allow any slight inconvenience to deprive a child of its proper nutrition. Unfortunately, it is a fact too frequent in this country, that the infant is consigned to the risk of artificial feeding, or to the care of a hired nurse, in cases where no necessity for such departure from nature's order exists. If mothers could see and understand this evil in all its bearings,—if they could follow the destiny of the child banished from the breast, and watch its gradual, daily decline, and death for want of its natural food—they would, we believe, in many cases, make greater efforts to fulfil their duty to their own offspring.

In cases where, happily, it is resolved that the child shall have its natural diet, some hours, or perhaps days, may elapse before the secretion of milk is ready. Here medical advice is required to correct the prejudices of nurses, who do not understand that, in ordinary circumstances, an infant is well able to bear a fast of twelve hours immediately after its birth. In this interval, while the flow of the mother's milk is deferred, the nurse is too commonly anxious to supply the supposed want by pouring gruel or panada into the child's stomach; and the consequent indigestion and flatulence are, perhaps, treated with "dill-water" or some other carminative. This process is useless and mischievous; but when there occurs a delay of some days in the secretion of milk, the child must be supplied with the nearest possible imitation of its natural diet. This will be found in a mixture of cow's milk and warm water in equal parts, with the addition of a small quantity of refined sugar.

In many instances, nurses are found too ready to suggest to the mother that her strength is inadequate to the duty of suckling her infant. The experienced medical man will

easily put aside imaginary difficulties. He will assure the mother that her power to nourish the infant is sufficient, without the aid of artificial food. The child will be rescued from false treatment, and restored to the breast; and the secretion of milk, thus encouraged by its natural stimulus, will soon be found copious enough.

The diet of the nursing mother should be the same in quality as before her confinement; but, through increase of appetite, she may require a somewhat larger quantity of food, which should always be simple—not rich and stimulating. The common error of partaking too freely of wine, ale, or porter during the period of suckling, should be avoided. Occasionally the action of the bowels may require the aid of medicine; but aperients should be selected carefully, as they must affect the quality of the milk, and consequently the health of the child. Frequent gentle exercise in the open air, the use of a tepid shower-bath, or sponging the body with tepid or cold water, may be strongly recommended to the nursing mother.

So far, we have proceeded on the supposition that the mother obeys the dictates of nature and nurses her own child. It would be impossible to insist too strenuously on this point, as it seriously affects the question of public health. Let not the infant, for any trivial reasons, be exiled from the mother's breast. Let nothing less than disease, or physical inability, deprive the child of its natural nutrition.

In cases where the mother either cannot, or, on medical authority, must not suckle her own child, the choice of a suitable wet-nurse will require consideration. If we are careful of the quality of animal food given to adults, how much more studious ought we to be in selecting the first nutriment of the sensitive infant! In age, constitution, and temperament, it is well that the wet-nurse should, as nearly as possible, resemble the mother: of course, with the exception of any morbid traits in the latter. Sound health, regular appetite, clear complexion, good temper, freedom from every sign of cutaneous or scrofulous diseases—these are some of the chief marks of the eligible wet-nurse. Her milk should be thin, and of a bluish-white colour and sweet taste; and, after standing awhile in a vessel, should throw up a considerable quantity of cream. If dropped in water, it should assume a light cloudy appearance, and not fall to the bottom in thick drops. The diet of the wet-nurse should be generous, yet temperate. Indulgence in ardent spirits must be strictly prohibited; and, if stimulus is required, a moderate

quantity of pure malt liquor, such as Bass's or Allsopp's ale, may be allowed. When the nurse is—as she should be—competent to the discharge of her duty in nourishing the infant, no other kind of food should be given. To give solid food, such as *bouillie* (flour boiled in cow's milk), while there is a good supply of far superior nutriment in the breast, is a gross folly.

Mauriceau has recorded the case of a healthy child which was fed, on the third day after its birth, with *bouillie* (or flour boiled in milk). The consequence was, that the infant died under a severe attack of colic attended with convulsions. There can be no need of any artificial food, if, during the first five or six months, the infant is applied to the breast at regular intervals of about three or four hours, by night as well as by day. The appetite of the child can be thus duly understood and satisfied by regularity of attention. "A single ounce of milk", says Dr. Combe, "well digested, will nourish more than double the quantity when it oppresses the still feeble stomach."

Diet of a Premature Child. Perhaps this will be the most suitable place for a few hints on the nursing of children prematurely born. Immediately on the premature birth of an infant (when there is hope that it may live), a healthy nurse should be found, so that the infant may at once be nourished with natural food, instead of waiting for the appearance of the mother's milk. It is desirable, in such a case, that the nurse should have small nipples, such as may be inclosed within the lips of the infant. If it be too feeble to suck, the artificial milk, before alluded to, must be administered by means of a small teaspoon. Its feeble stomach and digestive powers will require but a small quantity at a time, perhaps not more than two or three teaspoonfuls of the mixture of milk and water, but at shorter intervals—say every hour or two, unless longer sleep should prevent.

There is a popular prejudice in favour of children born at the seventh month of pregnancy, and against the surviving of eight months' children. This notion, however, is entirely without reasonable foundation; for it is a fact ascertained beyond doubt, that the seven months' child has a less chance of living than one of eight months, as the latter has a less chance than the child at the full period: but, with careful and delicate attention, both the seven months' and the eight months' child will be likely to live. It need hardly be said, that attention to a strictly natural diet is of especial importance in such cases.

Weaning. Weaning implies a *gradual* withdrawal of the infant from the breast, and a careful substitution of other food in the place of the nurse's milk. The younger the infant, the greater the care required in the choice of food adapted to its digestive organs. We are easily guided by nature to determine, in all normal cases, the proper time of weaning. It is clearly indicated by the appearance of teeth; and, therefore, should generally take place between the seventh and the twelfth month. Here we would offer a word of caution against protracted suckling. Constitutions capable of nursing with impunity a strong healthy child for some length of time beyond twelve months, are but rarely met with; and medical men frequently observe the injurious effects of such attempts, both to mother and child. What these injurious effects are, it is not our province in this chapter to describe, but the opportunity could not be allowed to pass without thus briefly adverting to them.

If weaning have been determined upon, a proper quantity of the best diet should now be regularly given at intervals of about three hours each, and the child should no longer be disturbed by a want of food during the night. To avoid this, a sufficient meal should be given a short time before the infant goes to rest, and it should be fed early every morning. A common plan is to wean the child during the day, and for some time to continue to nurse it during the night; and this is unobjectionable, provided the mother do not allow the child to convert the night season into a regular period of feasting. Should the child fall into this bad habit, the mother will rise in the morning exhausted and unrefreshed, and the child's digestive organs will probably become disordered. To guard against this, let the breast be given at longer intervals during the night, and its artificial food as late at night and as early in the morning as convenient.

But of what materials should the diet now consist?

Food during and after weaning should not differ too much from the qualities of the previous milk diet. To make the change from the breast to the new diet gradual, the infant should be allowed to take a little soft and mild food, such as wholesome bread steeped in milk and water, as soon as any teeth have appeared, and thus he will be gradually prepared to leave the breast. But, even after weaning, the diet should still be mild, such as rice, oatmeal, gruel, panada, or biscuits steeped in water, with the addition of a little milk and sugar, and gradually other similar articles of food may be added. The yolks of lightly boiled eggs are rich in nutritious matter.

The *lait de poule*, a French preparation, may be made by shaking or beating up the yolk of an egg in more than half a pint of water sweetened with a little sugar. Hard's farinaceous food, Leman's tops and bottoms, or Dodson's biscuit-powder, may be tried; or, if these disagree with the stomach, weak beef-tea, veal or mutton broth, without fat, and mixed with an equal quantity of farinaceous food and a few grains of salt. Bullock's Semola, a preparation of the gluten from wheat, is a light, digestible, and nutritious article of food for infants and invalids, which I have frequently recommended, and found to agree well with the stomach, when other preparations and kinds of food had failed. No general rule as to the particular food which will be suitable during the process of weaning can be laid down; for in practice it is repeatedly observed that one kind of food, which agrees remarkably well with one child, as decidedly disagrees with another. The general principles which have been insisted on must be followed, namely, of giving sufficiently thin and light food, and not in too large quantity; and selection must be made, after sufficient trial, of that particular preparation which suits best the stomach of the child.

Salt and sugar are the only proper condiments to be allowed in the food of children. Though I have strong objections to the use of sweetmeats, I would not deny the use of sugar, which is a luxury that may be safely enjoyed in moderation. A due proportion of salt should always accompany a vegetable diet.

Beverage. When we turn to consider the proper beverage of childhood, we meet an abuse which calls for the severest reprehension. One might imagine that all persons endowed with common sense would understand that pure water, with or without a proportion of milk, or well made toast-and-water, must be the proper drink during the excitable period of childhood; but unhappily we are compelled to advert to the fact, that some parents and nurses—not knowing the nature of what they do, have the pernicious habit of administering to children, not only tea and coffee, but wine, malt liquors, or even—generally as a cure for some slight complaint—ardent spirits! It is a duty to explain clearly the tendency of this practice. It tends to injure the child and the future man, not only physically, but also morally. Proofs of this are unhappily too abundant: there can be no dispute on the point. Whatever may be said regarding the use or the abuse of wine, ale, or spirits, with regard to the *adult* constitution, it must be observed that on the delicate, excitable,

and impressible constitution of children, such stimulants act with a tenfold pernicious effect, hurrying on the circulation —naturally quick in youth—vitiating the stomach, disturbing the nervous system, and producing an undue afflux of blood to the head. Common sense, without any help from physiology, might surely put down the practice against which we direct this paragraph. If wine or other alcoholic stimulants are suitable *medicines* to revive the languid circulation and sustain the animal warmth in cold and feeble old age, how can they be proper articles of diet for the precisely contrary condition of childhood? The fire required in the midst of December's snow is surely not wanted in the height of summer warmth! A spur to the youthful pulse is surely not required when it naturally runs at a pace which would indicate fever in an adult! Besides, the growth of the appetite for alcoholic stimulants, when frequently indulged, is well known to be rapid; and I would therefore ask, if a child of six years of age is allowed to drink a glass of port or sherry wine then, *what* and *how much* liquor may he be expected to take when he is a man of sixty? I would lay it down as a rule, that no alcoholic stimulants should be tasted during childhood. The few exceptions to this rule are cases which should be referred to medical treatment. If a medical man is consulted with regard to administering to a child a dose of rhubarb and magnesia, he should in all consistency be consulted before such a medicine as *port wine* is given.

Artificial Feeding. Hitherto, I have proceeded on the supposition that the infant has been nourished either by the mother or a well chosen nurse. But there may be cases in which it would be highly improper to allow the mother to suckle her own babe, while it may be difficult to employ the services of a good wet-nurse. In such a case, we must, with the utmost caution, employ a system of *artificial feeding.* On this point I must especially request parents to bestow the greatest care and attention; for, as the mode of artificial feeding is plainly a deviation from the plan of nature, we should study to make such a breach of rule as small as the circumstances of the case will allow. *A very considerable part of the mortality of infants reared by hand is the result of errors, respecting either the quality or the quantity of the artificial food administered.*

In the first place, I would observe that where an infant is to be brought up by hand, or where there exists a probability that ere long artificial feeding will have to be resorted to, it ought not to be put to the breast at all; weaning it after it

has been accustomed to the breast-milk for a few weeks, is exposing it to imminent danger.

According to the principles already laid down, it is clear that the artificial food of infancy should form the *best possible imitation* of the natural milk which *ought* to be the diet of the infant. In order to succeed in this imitation, we must carefully study the properties of the original. Milk is the perfect form in which nature presents to us the three essential constituents, *saccharine, oily,* and *albuminous* matters, necessary to support infant life. It may be resolved into three organised compounds, which we may designate by the familiar terms, *cream, curd,* and *whey.* These three constituents vary in proportions in the milk of various animals, as the following table will show:—

Properties.	Human.	Cow's milk.	Goat's milk.	Asses' milk.
Casein	2·95	4·48	4·02	1·82
Butter	5·20	3·13	3·32	0·11
Sugar	6·34	4·77	5·28	6·08
Saline matters ..	0·45	0·60	0·58	0·34
Water	85·06	87·02	86·80	91·65
Total	100·00	100·00	100·00	100·00

We see, in the above table, that the milk of the cow contains a considerably greater proportion of *casein* (or cheese-like matter) than human milk. Now it should be observed that this *casein* is the least digestible of the constituents of milk; and from this fact we learn the necessity of *diluting* cow's milk, so as to adapt it to the tender organisation of the child. The milk of woman contains a larger proportion of butter than that of the cow; and hence is inferred the propriety of adding a small quantity of cream to the diluted cow's milk, given in feeding by hand. But the addition of cream is not so important as the proper dilution of the milk. The foregoing table also shows us that it is proper to add to the diluted cow's milk a small quantity of loaf sugar, to increase its resemblance, in the saccharine quality, to the milk supplied for the child by nature. Moist sugar may be used occasionally, if the infant's bowels are confined; but let this be noticed—the free use of sugar is not to be recommended; it tends to cloy the stomach and weaken the digestion, thus producing acidity, sour eructations, and flatulence.

For the first four or five months, let a mixture of fresh cow's milk and pure boiling water, in equal proportions, with a small quantity of loaf sugar, be used. For the first fortnight the proportion of water may often be advan-

tageously increased to two-thirds; but, as a general rule, the best mixture for a healthy, full grown infant, will be of equal parts of milk and water. At the expiration of the fourth or fifth month, pure, fresh, undiluted milk may be *gradually* substituted for the diluted mixture. If, at any time, sickness or disorder of the bowels occur, either diminish the quantity, or try it somewhat more diluted, until these symptoms subside. If, on the other hand, no disorder of the stomach or bowels is produced, and the infant is not satisfied with the above mixture, gradually diminish the quantity of water, or try the addition of *one teaspoonful of cream* to four ounces of the mixture of milk and water.

The above *recipe* for an imitation of the mother's milk may appear to some nurses as a very poor and thin sort of diet; and they may, consequently, think it advisable to deviate from it by now and then giving to the infant more substantial fare, in the shape of gruel, panada, or some other farinaceous preparation. Here the physician has to contend with a very obstinate and firmly rooted prejudice. The nurse imagines that, because a cup of gruel contains a considerable quantity of nutriment (even for an adult) it must, therefore, be suitable to strengthen the infant, and never considers that, if the infant's stomach is not prepared to digest and assimilate such food, the effect must be injurious. Frequent observation of the bad consequences of this prevailing error among nurses leads me to state here, emphatically, that an infant brought up by hand is much safer and has a much better chance of thriving with the said mixture of milk and water, than when a stronger food is used. Why? Because the former is well digested, while the latter is not; and all indigestible food produces irritation and oppression. It is quite certain that the mortality among artificially fed infants (which is confessedly *very great*) may be considerably diminished by careful attention to this point.

If gruel, panada, and similar food must be condemned, when they are inconsiderately administered to the infant, what must be said of the practice of giving to a toothless child such substances as solid bread, potatoes, or the flesh of animals—roast beef, for instance. One might think that common sense would sufficiently show the absurdity of such treatment. Nature has given to all creatures intended to consume flesh suitable teeth to tear and masticate it, and the adult human being is furnished with such teeth; but look at the mouth of the infant, and observe for what purpose it was intended. The tender and toothless gums, the soft, full and prominent lips, the whole formation, admirably adapted

for receiving a bland, fluid diet by suction, but totally unfitted for mastication,—do not these signs clearly show the impropriety of giving to infants the diet of adults?

With regard to the *quantity* of the first artificial food proper in the early stage of infancy; let it be considered that the stomach is small and unaccustomed to its functions. Let the diet of the infant be gently given in small quantities. Let the first symptom of indifference be noticed as a sign that the appetite is satisfied for the present. As a general rule, we may state that six or eight tablespoonfuls will be enough to be given at one time. It is true that, when too much is given, nature (infinitely wiser than the "cramming nurse") provides a remedy for the evil by vomiting. But even this very emphatic pronunciation of "no more!" from the stomach, does not convince the nurse of her error. She only observes it, and says, "Ah, 'tis a good sign! the child is healthy." This again is an error. It is certainly well that the stomach can thus throw off the superfluous matter, but it would be far better to make the vomiting unnecessary.

It will be understood, from all that has been said of the propriety of imitating the mother's milk as closely as possible, that the milk and water should always be given neither hot nor cold, but *warm*. *The milk,* however, *should not be warmed over a fire* (for by boiling its nutritive quality is diminished), but only by the admixture of the proper quantity of water previously heated, so as to raise it to the temperature of milk from the breast, namely, from ninety to ninety-five degrees Fahrenheit; and in all cases in which care is needed, a thermometer should be employed in order to ensure the food being always given at the same temperature. Great care is necessary, especially in towns, in order to obtain genuine cow's milk. It should be procured, from time to time, *fresh from one healthy cow, and not mixed with the milk from any other cow.* The milk sold in large towns is commonly adulterated with chalk, starch, flour, and even still more objectionable ingredients, as well as diluted with water. If, however, arrangements cannot be made to procure pure fresh milk from one cow, due allowance must be made for the dilution it has already undergone—and a smaller quantity of water will be required from the first.

Human milk is alkaline, and, even when kept for a considerable time, shows but little tendency to become sour. The milk of animals, in perfect health, likewise invariably presents an alkaline reaction, and cows when at grass form no exception to this rule. Comparatively slight causes, however, exert a marked influence upon the milk of the cow in

this respect; and if the animal be shut up and stall-fed, its milk almost constantly acquires a strongly acid property,* a fact which of itself is sufficient to account for the symptoms of gastric and intestinal disorder so often produced by it in the case of children brought up in large towns. Whenever, therefore, the attempt is made to rear an infant by hand, under circumstances which render it impossible to obtain the milk of cows which are at pasture, it is desirable that the milk should be daily tested, and that any acidity should be neutralised by the addition of lime water or of finely-levigated chalk, in quantity just sufficient to impart to it a slightly alkaline reaction. If the bowels are inclined to be constipated, carbonate of magnesia may be substituted for the chalk. The possibility of the occurrence of this acidity, and of the various adulterations referred to, shews the necessity, when an infant who is brought up by hand fails in health, for making a careful inquiry into the source of the milk with which it is fed; and for examining the fluid both chemically and under the microscope, before proceeding to prescribe remedies for ailments which may be caused entirely by the unwholesome nature of its food.

The rules which have been given for artificial feeding will generally be found to succeed. If they are faithfully carried out in all cases where the infant cannot be nursed by its mother, the mortality at this period of life will be very considerably diminished. Among many illustrations of their successful application in practice, may be mentioned the following instance: A mother had attempted to rear by hand nine children in succession, in consequence of a physical inability to nurse them herself; and each of them had died before it had reached the age of twelve months. It was obvious that an improper diet had been used. After the tenth confinement, the child was treated in accordance with the principles herein laid down, and is now living and healthy.

It must be admitted, however, that some *rare* cases occur, in which every attempt to rear a child, by the most judicious course of artificial feeding, will fail. Five cases of this kind have come under my notice. A state of stupor comes on, which gradually terminates fatally. The remedy, of course, is a healthy wet-nurse.†

* See the results of Dr. Mayer's observations on cows in Berlin and its neighbourhood, in a valuable paper on the artificial feeding of infants, in the Transactions of the Obstetric Society in Berlin, 8vo, Berlin, 1846; and Dr. West's Lectures on the Diseases of Infancy and Childhood.

† See *Medical Times*, October 11, 1851; or Half-Yearly Abstract of the Medical Sciences, vol. xiv.

(*To be continued.*)

ON FERMENTING ALVINE EXCRETIONS AS A SOURCE OF DISEASE.

By C. H. F. ROUTH, M.D., Physician to the St. Pancras Royal General Dispensary, Assistant-Physician to the Samaritan Hospital, and Vice-President of the Medical Society of London.

HUMAN alvine dejections, according to Dr. Marcet's analysis, consist of *excretine,* a peculiar animal matter; *margaric acid,* an oily acid; *colouring matter,* like that of the blood; a light *granular substance,* which is believed to be a combination of phosphate of potash and a pure organic matter; and an olive-coloured acid, *excretoleic acid.* There is no evidence of butyric acid. Excretine contains both sulphur and nitrogen, and is not found in the excreta of the carnivora. But a substance like it, together with butyric acid and cholesterine, exists in those animals. In the herbivora, neither *butyric acid, excretine,* nor *cholesterine* is found, except in the crocodile, in which cholesterine exists. The salts of these matters are, in the main, potash, lime, phosphoric acid, and magnesia. Human dejections are richer in nitrogen than those of other animals; they yield 4 per cent. to the latter 2 per cent., at least if the food be animal and not vegetable in excess; 7 per cent. consist of undigested residue of food. A very small quantity of this excretion can be looked upon as secretion in health, although in disease some matters may be abnormally secreted, as in cases of colliquative diarrhœa in consumption, or of excess of the alvine dejection where the same amount of food is taken: gaseous products are excreted in tympanitis, or when two ends of an intestine are artificially tied. Lastly, excretive matter can be artificially prepared out of the body by the action of certain acids on the ordinary products of food.

When the bowels are unusually constipated in certain cases, the matters retained undergo a species of *fermentation,* which may be of two kinds: *eremacausis, i.e.,* changes effected by exposure to moisture or air at certain temperatures, but without production of odour; and, secondly, *putrefaction, i.e.,* the same with offensive odour. In regard to the first of these, many of the normal healthy changes in the body are products of fermentation; and all animal substances, such as flesh, blood, bile, urine, the mucous membrane of the stomach, intestines, or bladder, or the skin, may act, if putrescent, as ferments, each giving rise to a particular kind of fermentation, which will go on so long as there is a substance present from which the ferment was originally formed, and whenever there is a compound capable of being decomposed by contact by the ferment.

There are certain circumstances that favour putrefaction,

and others that prevent or retard it. First, oxygen favours it, especially when diluted with nitrogen. Hypophosphoric acid has the same effect; pure nitrogen retards it; hydrogen, carbonic acid, and nitrous acid also retard it. Electricity favours it; if meat, however, be put in an electro-negative state, it repels oxygen, and so keeps fresh for a long time. Aqueous vapour favours it; very dry air retards it. A stream of water delays the change: also the water of privies—this being due to the large excess of ammonia present. Creasote and smoke arrest or prevent it. Dr. Richardson finds that nitrogen gas and chloroform vapour, or the presence of phosphorus, prevent putrefaction. Sea water, especially if diluted with fresh water, favours decomposition.

With regard to fermentation in the body, it seems, from some experiments by Magendie and Chevreuil, that carbonic acid, nitrogen, hydrogen, carburetted hydrogen, oxygen, and sulphuretted hydrogen, are formed in the intestines during digestion, by fermentation; this fermentation, however, is greatest in the large intestine, because unimpeded by the presence of free acid. Dr. Ayres, in addition to these gases, mentions phosphuretted hydrogen. Sometimes, however, this fermentation proceeds to putrefaction, as shown by Lehmann and Frerichs, who found in retained and putrefied alvine dejections substances precisely similar to those obtained by Bopp from putrefying protein bodies. Dr. Ayres has indicated some of the changes which occur in putrefying night-soil, from which ammonia, sulphuretted hydrogen, and a very fetid liquid can be obtained. In common sewers two kinds of gases are evolved; one common, which consists of oxygen, 13; nitrogen, 81; carbonic acid, 2; sulphuretted hydrogen, 3; besides a small quantity of ammonia: another less common, and consisting of oxygen, 2; carbonic acid, 4; nitrogen, 94; sometimes with ammonia. Alvine dejections sometimes undergo remarkable changes in the body even during life, not to speak of the admixture with these of blood, pus, etc. They vary in chemical reaction, sometimes being very acid, sometimes neutral.

Infection through alvine matters occurs in three ways: I. When such matters are absorbed in their natural concentrated state. II. In solution, or after suspension in water. III. When the emanations therefrom are inspired. But, in order that infection should be propagated, three conditions are required: 1. An infecting source. 2. A transmitting medium. 3. A fit recipient.

1. The infecting source may be the sick person, his

fomites, excreta, etc. These sources are always more concentrated and potent at the beginning of an epidemic, weaker at the end.

2. The transmitting medium may be (*a*) *liquid*, as serum or blood, as in inoculation; or water in which poison is suspended or dissolved, and taken into the body; or it may be (*b*) *gaseous*—air containing a volatile substance. The thermometrical and barometrical changes which influence the gaseous infection may be the reverse of those which influence the liquid; the gaseous being more energetic in *hot* or *moist* weather, the liquid in *temperate* and *dry* weather; because in the first case the air is lighter, and the ammonia (which helps to suspend volatile poisons in the air, and to raise them to the nose) exists in larger quantity. Hence the foul smells of drains are more sensibly experienced at such periods; whereas in moderately cold and dry weather the air is heavier, less ammonia is generated, and the poisons are kept nearer the surface of the earth.

3. There must be fit recipients. The fitness, as such, will be modified by *race*, as in the case of a negro, who is less susceptible to fever than a white man; by *species* in animals, as is illustrated in the fact that the dog is innocuous to inoculation with plague matter; by *concentration* of the poison, which will infect the same man by its greater potency at the beginning of an epidemic rather than at the end; by *acclimatisation*, the effects of which are seen in a yellow fever district, where the old residents suffer less than new comers; by *previous disease*, as instanced in the well known fact that a disease may sometimes not be taken more than once; by *occupation*, which renders some men more exposed than others; by *state of health*, and by *food* supplied. These are all modifying causes; and, if they are not duly attended to, the greatest confusion results in the observation of an epidemic.

I. Effects of Alvine Dejections in Substance. Healthy dejections are not poisonous; those of the horse, for instance, formed as they are from retained nutritive matters, are eaten with impunity by birds. The experiment is also voluntarily performed by voracious dogs, and even by hysterical and demented human beings, with impunity. Diseased alvine dejections are, however, poisonous; that is, those in which fermentation has occurred. The simple retention of these in the bowels may give rise to serious disease, and aggravate all forms of epidemics. Such are the opinions of Burn, in his work on *Habitual Constipation*, and of Hamilton, in his work on *Purgatives*. When matters have been long retained

in the bowels they give rise, on the one hand, in extreme cases, to symptoms very analogous to those produced by the inoculation of putrid matters in the blood, viz., *low fever and typhoid symptoms,* and *delirium;* or, on the other hand, to those symptoms produced occasionally when putrid animal matters, as sausages, cheese, and pork, are partaken of—symptoms, I mean, of *violent purging and vomiting,* in more acute cases, and of dyspepsia, general wasting, debility, nervous affection, in cases where the poison acts more gradually. The habitual foul breath and tongue, and the generally offensive odour of persons who are habitually constipated, is evidence of the same slow poison in action. The very propinquity of alvine matters causes the pus in abscesses in the neighbourhood of the bowels to undergo putrefaction. The effects of cholera dejections on man and the lower animals are peculiar. Five case have been quoted by Dr. Richardson, in his review on the water supply in London (JOURNAL OF PUBLIC HEALTH, vol. i, p. 130), in which five persons partook of these; four took cholera, and one died. The experiments upon animals are unsatisfactory. Those made by Thiersch with putrid choleraic dejections, communicated cholera to white mice; but in other hands, although violent purging and vomiting in dogs and cats were induced, and death occasionally occurred, the algide symptoms of cholera were absent. There is reason to believe that typhus and yellow fever are occasionally produced by the retention of putrid alvine matters. One variety of malignant puerperal fever, accompanied with mania, was without doubt produced by a similar cause; and there are ordinary cases of mania, which may possibly be traced to the same poison in operation.

II. FERMENTING ALVINE DEJECTIONS AS A CAUSE OF DISEASE, AFTER SOLUTION OR SUSPENSION IN WATER. Some substances require a certain amount of *moisture* to ferment, *i.e.* to absorb oxygen; thus meat in dry oxygen will keep for a long time, but will be speedily decomposed in moist. If a *small amount of ferment is added* to a body in water, the body decomposes much sooner than if it were left to generate independently a ferment. Water under certain circumstances contains an excess of oxygen. Some animalcules, such as *glamidonas pulviculus,* generate oxygen in large quantities; and several water plants, such as the *valisneriæ* and *anacharis,* emit oxygen gas. Water under these circumstances highly favours fermentation. Perhaps also this process is encouraged by an excess of chemical rays in the light. In many cold countries there is excess of oxygen in a given volume of air,

from the increased density of the atmosphere. This excess is also found in snow; hence, if snow is soiled by slops thrown upon it, and is subsequently melted down for drinking water, and so contaminated is partaken of, the matters contained in it soon begin to ferment in the alimentary canal; a fact which helps to explain one cause at least of cholera in St. Petersburg and Moscow, when the temperatures were below zero, for emanations at such temperatures are impossible. But a dry and dense atmosphere is not necessarily confined to, though more common in, cold weather. Experience proves that during some epidemics the air is both dry and heavy, while the water is abnormally warm. This was the case in the three epidemics of cholera of 1832, 1848, and 1854; the air being also in a weak, positive electrical state—a state, as before seen, favourable to putrefaction.

Fermenting alvine dejections may be productive of particular diseases.

1. *Cholera.* Three epidemics of cholera,—one in Newcastle, another in Lambeth, and a third in Golden-square,—all afford, as set forth by Dr. Snow in his work on Cholera, indications of the propagation of disease by fæcal matter.*

a. Newcastle and Gateshead. The deaths in Newcastle in 10,000 population, were in 1831, 182; in 1849, 41; in 1853, 178. In Gateshead, in 1849, there was a comparative immunity; in 1853, 166 deaths occurred. In 1831, there were no waterworks; in 1849, the water supplied was good; in 1853, it was bad. The waterworks in both towns are the same. Before 1832, the water was obtained from the Tyne, a mile above the town, the tide flowing six miles beyond it. In 1848, waterworks were made, and water was supplied from Whittle Dean, a stream ten miles above the town. In 1853, the quantity supplied from this source was found insufficient, and the original waterworks of 1832 were again had recourse to. This water was so bad in 1853, as to contain 15.6 per cent. of impurities. As the water supplied was pure or impure, so the mortality from cholera was low or high. It was greatest from the 13th to 23rd of September. Owing to the outcry against the Company, no more Tyne water was supplied after the 15th, and the Tyne water was out of the pipes about the 17th, from which time the mortality decreased. As corroborative evidence, it may be remarked, that the inhabitants of the places supplied with *pump water*, and not with that of the Company, suffered only from diarrhœa, not from cholera.

---

* See also JOURNAL OF PUBLIC HEALTH, vol. i, p. 130.

b. The *Lambeth district* of London is supplied with water from two sources: the Lambeth Company's works, and those of the Southwark and Vauxhall Company. The Lambeth Company, in 1849, got its water from the Thames near Hungerford; in 1854, it obtained it from Thames Ditton. The Southwark and Vauxhall Company has always obtained its water supply from near Battersea Bridge. In 1849, the mortality was pretty near the same in both districts. In 1854, the mortality of the district supplied by the Southwark and Vauxhall Company was, for the first four weeks, twenty times as great as in the district supplied by the Lambeth; and for the next three weeks, eight times as great. The cause of this difference is due to the fact that during the period between the two epidemics, the source of supply for the Lambeth Company's works had been changed,—being taken many miles higher in the Thames. It was thus less impregnated with the London sewage than was the water of the Southwark and Vauxhall Company, which, on examination, was found to contain alvine matters in suspension.

c. Golden-square. Upwards of five hundred deaths occurred here in ten days. The outbreak commenced on the night between the 31st of August and 1st of September, and was distinctly traced to the drinking of water from a particular pump in Broad-street. The history of the cases has been most ably traced out by Dr. Snow. Persons who partook of the water of the Broad-street pump, though they lived at a distance, took cholera and died. Those who lived near it, and partook of other water, escaped. It was found subsequently that in a house opposite the pump, on a day or two preceding the outbreak, a boy had had cholera, and that the pipe of the water-closet conducting from this house passed close to the pump pipe; and, the mortar work between the two pipes being broken down, the alvine dejections of this cholera patient were thus freely intermixed with the pump water. A comparison was then made between the water of the water companies and of pumps. Both contained organic matter, dead and living; annelidæ, dromelaceæ, diatomaceæ, infusoria, confervæ, fungi, hairs of animals, starchy matter, vibriones, but no animal peculiar to cholera. The water of the Southwark and Vauxhall, Lambeth, and West Middlesex Companies, contained three specimens of sea-water animalcules. A few of the pump waters contained a notable quantity of sewage matter. The waters from very deep wells were remarkably free from organic matter.

2. *Typhus and Typhoid Fever.* In an epidemic of typhus

fever which broke out in Hastings, the disease was traced to bad water, the dejections of a typhus patient having been mingled with the system. The Croydon typhoid fever of 1852, and an epidemic which broke out in North Boston, Erie County, U.S., were traceable to the same general cause. In many parts of London, owing to the nature of the soil, more or less sewage matter becomes mixed with the water. The absence of smell in such waters or its clearness is no proof of its being uncontaminated. Generally speaking, there is typhus fever present wherever the water is thus poisoned.

3. *Diarrhœa* is a common effect of drinking bad water. Some very bad kinds of dysentery are also produced by this cause, and instances are plentiful where the disease has broken out in consequence of an admixture of sewage matter with drinking water. The same cause was in operation in the production of the plague at Cairo; possibly it is so in some epidemics of yellow fever, as shewn by Dr. Snow.

The effect of fermenting poisons, after their development in water, seems to be more powerful than when they are taken in substance; and to be somewhat modified both in degree and kind, as we shall hereafter see, when they are inhaled as emanations.

III. Emanations from Alvine Dejections as a Poison. There are three admitted conditions necessary for the emanation of miasmata; 1st. A certain amount of temperature; 2nd. Moisture in the air; 3rd. The evolution of ammonia. An opposite state leads to deposition on the surface or in water. Emanations are not possible below 32 F. The ammonia, if formed then at all, will keep to the surface; and the same is true of watery vapour. A cubic inch of air at zero F. can only contain .836 grain of moisture, while at 95 F. it contains 17.009 grs. At 11 F. almost .0 grains are contained, while at 50 there are 2½. In dry fine weather, especially if cold, drains do not smell; in damp weather they are very offensive. So true is it that dampness often exists with epidemics, that Dr. Barton, of the United States, has founded thereon a theory, which has been supported by Dr. Hunt of Buffalo (*Transactions of the American Association*, 1854), that without the conjunction of dampness and what he called terrene causes, no epidemic can occur. Terrene causes are any causes which may give rise to miasmata, such as upheaval of soil, and decay of organic matter. But, besides watery vapour and ammonia, there are probably other gases evolved, such as carburetted hydrogen, sulphuretted hy-

drogen, phosphuretted hydrogen, and carbonic acid. In the decomposition of alvine matters there are the two kinds of compound gases before alluded to; the second of which kills because it is irrespirable; the first, because it contains an excess of sulphuretted hydrogen. The symptoms produced by phosphuretted hydrogen and carburetted hydrogen are not clearly made out, particularly when small quantities only are inspired. The symptoms produced by the inspiration of sulphuretted hydrogen in small quantities are those of gradual prostration of the physical powers, general debility, followed by emaciation, and low fever; generally, too, all diseases, if long exposed to sulphuretted hydrogen emanations, assume a typhoid and putrid character. The temperature at which these diseases develope themselves varies probably with each disease; however, the ferment is destroyed at very high as well as at very low temperatures. Yellow fever ranges between the temperatures of 60 and 90. But there can be no doubt that something more is required, and this is to be found in the *electrical* state of the atmosphere. We have already seen that a positive electrical state of the atmosphere favours decomposition, and therefore disease in man. The same state of electricity favours vegetation: hence, perhaps, the concurrence of very active vegetation in pestiferous districts. As vapours ascend, so does positive electricity. This effect is less powerful in dry air. In some cases the electricity of the animal body is reversed. In health the mucous membrane gives negative electricity, and the skin positive: in typhus, these conditions are reversed.

Injurious Influence of Night Soil Emanations. Drs. Lewis and Sutherland give instances of this. Near Christ Church workhouse, Spitalfields, there was, in 1848, a manufactory for artificial manure; this caused a most powerful stench. Whenever the wind blew in that direction, then numerous cases of fever of typhoid character, a typhoid tendency to measles, small-pox, and other typhoid diseases, and an intractable and fatal form of aphthæ, originated. In December 1848, sixty of the children were seized with diarrhœa in one morning. The manufactory was obliged to cease its operations, and so disease ceased in the workhouse. Five months afterwards, it was reopened. The night following, the direction of the wind being towards the workhouse, forty boys were seized with diarrhœa; the girls, whose dormitories faced in another direction, escaped. The nuisance was again suppressed, and the disease ceased. The propinquity of a similar manufactory to St. George's, Southwark, produced

similar results, and were removed by the same measure. An epidemic of cholera broke out amongst the inhabitants of Crafton-terrace, Latimer-road, concurrently after the wind had blown towards it from the potteries at Kensington, a locality giving rise to most offensive odours from excess about it of putrefying night-soil and animal matter. The suburb of Witham, in Hull, a space of some three acres, on which night-soil and other manure is deposited, gives as the mean age of life 18, while in Hull it is 23. An apparent exception to the unhealthiness of such localities has been mentioned; viz., Montfaucon, in Paris, which is the great receptacle of the alvine matters of the Paris population. It is alleged that the health of the workmen engaged in that locality is excellent; typhus and low fevers seldom occur. The explanation is this. Good food is one of the best preservatives against such diseases. These workmen live on wholesome, although to us distasteful food; viz., horseflesh.* The other workmen of Paris have chiefly a vegetable diet. But, assuming that the locality itself is not insalubrious to the workmen, it is so at a distance, to the patients of St. Louis hospital, in the Faubourg St. Antoine, in which, whenever the wind blows from Montfaucon, puerperal fever breaks out among the lying-in women in that establishment.

Some of the diseases capable of being produced by emanations from excreta have now to be noticed.

1. *Cholera.* Pettenkofer believes that all diarrhœal fluids during choleraic periods will, after fermentation, develope choleraic poison; which, in its turn, will give rise, according to the case, to cholera, cholerine, or diarrhœa. At any rate, it has been proved by Drs. Alison and Budd, that the emanations from water-closets in which cholera dejections have been evacuated will produce cholera. The well marked case of a certain workhouse, in which all patients who were allowed to go to a contaminated water-closet caught cholera, while those who were prevented from going to it escaped, and this although both sets drank the same water, is evidenee of this fact. The sufferings of our troops when made to encamp in the same place where the Russian troops had previously encamped and suffered from cholera, is a proof of a similar kind; although the effect may be in part explained by the bad water drank. The hypothesis is still more strikingly supported by the experiments of Dr. Lindsay, in which the exposure of animals to the emanations arising from the de-

* See JOURNAL OF PUBLIC HEALTH, vol i, p. 192.

jections and blood and clothes of cholera patients gave rise to the specific characters of the disease in four instances, and to death in two. The apparent contradictions afforded by other experiments with an opposite result, are to be explained by reference to the different sources of error before dwelt upon. The suburb of Witham, before alluded to, proved very obnoxious to cholera, ninety deaths occurring in a small space of two hundred yards. The mortality in the prison at Brest was also very great. This prison has four wards, besides an infirmary. The wards have twenty-seven water-closets, communicating with a drain which terminates in the harbour. The infirmary is differently constructed. At low water the south winds blow from the harbour up the drain, filling the wards with poisoned vapours. The number of cases of cholera in the wards was 6·7 per cent., while in the infirmary it was only 1·3 per cent. Of the eight deaths from cholera in Hampstead, four took place in localities infested by emanations from night-soil. In Marylebone those generally suffered most who lived over stables.

2. *Dysentery.* There can be no doubt that this disease, particularly in certain malignant forms, can be generated by emanations arising from alvine dejections. The writings of Hildanus, Pringle, Sennertus, Chomel, Zimmermann, and others, prove that the disease may be generated by this cause. A particular instance illustrating this fact occurred in Morovelho, where dysentery was maintained either by the alvine matters being kept in open pans placed under the beds in the hospital, by the same water-closets being frequented by all the patients, or by the slops being emptied into the same; but when measures were taken to remove the pans and keep the place sweet, the disease soon disappeared. Dr. James Bird observed the same result in the Indian hospitals during the first Punjaub expeditions. The emanations from the dejections reproduced dysentery in others, and moreover developed hospital gangrene in the hospitals. During this period the air was hot and moist. In the second Punjaub expedition, the disease did not spread; but then the air was cold and dry, proving the powerful concurrent effects of heat and moisture.

3. *Typhus and Typhoid Fever.* Allusion has already been made to the prevalence of these diseases in the case of the Christ Church Workhouse. The writings of Mr. Grainger show that the air of cesspools greatly predisposes to typhus. In Munich, typhus is a disease unusually prevalent; for two-thirds of the town are without drainage, and the night-soil is collected in large holes in the yards. Gaol fever, plague,

and yellow fever are possibly developed, or are, at all events, very much intensified by the same agency.

Rules of Treatment to be adopted. If the views enunciated above are correct, the treatment to be followed is to give those remedies which impede or check fermentation; that is, *antiseptics*, such as the alkalies, the mineral acids, concentrated vegetable acids, volatile oils, alcohol, sulphurous acid, the metallic salts, mercury, arsenious acid, chlorine, creasote, phosphorus, charcoal, and tribasic phosphate of soda. Now, experience proves that these very remedies are those which have been found most useful in the treatment of these diseases, thus chalk mixture and alkaline earth have been given in diarrhœa; sulphuric acid and saline injections in cholera; mercury in fever; charcoal in dysentery, cholera, and fever. Further experiment will prove which antiseptics are most applicable to each disease. These measures, however, refer only to individuals. The several poisons arising from alvine dejections have to be combated in their origin and formation; for this object two agents have been recommended, *charcoal* and *fresh sea water*.

Charcoal, properly speaking, is not so much an antiseptic as a destructive; that is to say, it has the property of absorbing oxygen, together with the miasmata and the bad odour, and of consuming them by a process of low combustion. This subject has been extensively treated of by Dr. Stenhouse, and also in the Journal of Public Health by Dr. Richardson. Charcoal filters, if placed over gully-holes and water-closets, would render essential service. Still, all sewers would continue to emit foul odours, and some gully-holes must be left open to allow the mud and the rain to pass down. It is manifest, therefore, that the best plan is to deodorise the sewers themselves. To do this, hydrochloric acid, chloride of lime, and pure charcoal, would be too expensive. Mr. Durden has suggested the preparation of charcoal by the action of sulphuric acid upon sawdust as the best, because the cheapest, mode of preparing it; but there would even be a difficulty in procuring sawdust on a large scale. The plans usually adopted for deodorising manure appear, perhaps, preferable. These are, first, Mr. Salmon's method, which consists in burning the slime and mud at the bottom of large rivers, particularly those which pass through large cities. The amount of animal and vegetable matter contained in this slime is very great, and when burned, it constitutes a very effective charcoal. Secondly, Mr. Alfred Sampson's method, which is simply to use the cinders of peat or turf, or the simple refuse of carbonised peat. Third,

the bran obtained from sawn wood, the refuse of oak used for tanning purposes, the mould of the Parisian strata, or even simple clay, if carbonised, constitute an excellent disinfecting powder. Fourth, and lastly, Callond's method consists in the addition of the waste liquor of salt works to offensive matters, by which they are completely deodorised. It is stated by some, that carbonised peat is not so efficacious as other kinds of charcoal; if so it would appear that the method of Salmon is, after all, the most practicable, at least for London; at the same time, as the removal of the slime in and about the Thames would be of great benefit to the navigation of the river, and charcoal could be obtained from it in large quantities, and be mixed with the water used for flushing the drains, all odour would cease. All that would be required would be its forcible agitation with the water before it was thrown down in the drains. The same charcoal, used commonly in our water-closets, would remove all local bad odours; and the produce of the sewers would thus constitute ready made manure.

Fresh Sea Water. To say nothing of the expense of bringing sea water to London, this plan does not promise much; for, from experience at the sea-side, the inference is fair, that in warm weather, owing to the excess of sulphates, which would decompose, and liberate sulphuretted hydrogen in contact with animal and vegetable matters, the odours of our streets would be most offensive if watered with sea water. These sulphates, it should be remembered, amount to nearly four parts per thousand in the sea water in our channel; although in some seas (Mediterranean) they amount to seven parts per thousand, constituting, that is, from one-seventh to one-fourth the total quantity of the salts present in sea water. Moreover, sea water of itself contains a vast quantity of animal matter. The use of charcoal would be necessary to destroy this last, but it would not remove the sulphates. Hence bad Thames water, or the Serpentine water, would be preferable, if first purified by charcoal, to water our streets or to flush our drains.

In concluding this paper, I would state that many of the remarks made on the spread of epidemics, although applied especially to fermentation of alvine dejections, apply equally to diseases arising from the decomposition of other animal and vegetable matters. The same general principle obtains, in fact, in all, both as regards prophylaxis and treatment. I believe that much disease is produced and extended by the causes described, but that, with a little good will and industry, it might be entirely removed or prevented.

SANITARY AND SOCIAL SCIENCE.

REPORTS OF CITIES, TOWNS, & DISTRICTS.

ON THE AVERAGE MORTALITY AND PUBLIC HEALTH OF THE HASTINGS DISTRICT.

(*Continued from* vol. i, p. 419.)

In the former paper was given the annual rate of mortality in the Hastings District, and also the number of deaths from the principal diseases occurring in each month and each season. It is interesting and important to consider also the relative proportion which the deaths from different diseases bear, (1) to the total number of deaths from all causes; and (2) especially to the population of the place. It must, however, be borne in mind, that in Hastings the conclusions drawn from the registers of deaths are greatly influenced by the large number of invalids who resort thither during their last illness; a source of error that will be more particularly noticed hereafter.

With respect to the former inquiry, viz. the relative proportion which the deaths from different diseases and classes of diseases in Hastings bear to the total number of deaths from all causes, we need not do more than mention some of the laws laid down by Dr. Farr, and show how far they are confirmed by the experience of this place.

In the First Annual Report of the Registrar-General (p. 111, 8vo.) he says: "Wherever the absolute mortality is low, the number of deaths in the epidemic [*zymotic*] class, is less than the number in the pulmonary class; and, on the contrary, wherever the deaths in the first class exceed or equal those in the third [now the *sixth*, with the addition of *phthisis*], it may be affirmed that the absolute mortality is high." In the Hastings District, the average annual number of deaths in the zymotic class is about 68; the deaths caused by pulmonary diseases, including *phthisis*, are about 102.

Again, in the Thirteenth Report (Appendix, p. 133), he says: "In unhealthy years, and in unhealthy places, it may be laid down as a general law, that the zymotic diseases (Class I) are always more fatal than the diseases in the two next groups (Classes II, III); and that in healthy seasons and places the converse is true." In the Hastings District, the average annual deaths from Classes II and III, amount to about 106; while the deaths from zymotic diseases (as has been mentioned) are only about 68.

Average Number of Deaths in two Decennial Periods, from different Causes, and Classes of Causes.

Causes of Death.	1838 to 1847. Total number of deaths.	Proportion to 1000 deaths.	Proportion to 10,000 persons living.	1845 to 1854. Total number of deaths.	Proportion to 1000 deaths.	Proportion to 10,000 persons living.
I. Classes of Disease.						
Zymotic diseases	48·5	169·9	31·6	68·3	183·0	34·9
Dis. of uncertain or variable seat	16·1	56·4	10·5	19·7	52·8	10·0
Tubercular diseases	83·7	293·3	54·2	86·7	232·3	44·1
Dis. of nervous system	31·0	108·6	20·1	42·7	114·4	21·3
Dis. of organs of circulation	5·7	20·0	3·5	12·7	34·0	6·3
Dis. of respiratory organs	19·7	69·0	12·7	39·8	106·6	19·5
Dis. of digestive organs	17·2	60·3	11·2	21·8	58·4	10·9
Dis. of urinary organs; Childbth. & dis. of generative org.	5·7	20·0	3·6	6·4	17·2	3·2
Dis. of organs of locomotion; Dis. of integumentary system	·8	2·8	·5	2·3	6·2	1·1
Malformation; Infantile debility; Atrophy	16·9	59·2	10·9	26·4	70·7	13·3
Senile debility	25·2	88·3	16·3	30·3	81·2	15·3
Sudden (causes unascertained)	1·5	5·3	1·0	·6	1·6	·3
External causes	8·6	30·1	5·5	14·8	39·7	7·6
Causes not specified, etc.	4·8	16·8	3·2	·8	2·1	·4
Total	285·4	1000·0	184·8	373·3	1000·2	188·2
II. Individual Diseases.						
Small-pox	2·6	9·1	1·8	2·5	6.7	1·3
Measles	9·7	34·0	6·5	7·6	20·1	4·1
Scarlatina	5·3	18·6	3·6	2·0	5·4	·7
Hooping-cough	8·8	30·8	5·6	10·9	29·2	5·5
Diarrhœa	5·3	18·6	3·3	12·5	33·5	6·3
Fever	5·2	18·2	3·4	10·9	29·2	5·5
Dropsy	10·2	35·8	6·7	8·7	23·3	4·5
Phthisis	62·4	218.7	40·4	61·9	165·9	31·5
Hydrocephalus	16·3	57·1	10·7	11·0	29·5	5·6
Apoplexy	8·5	29·8	5·5	13·3	35·6	6·7
Paralysis	3·8	13·3	2·4	5·3	14·2	2·7
Convulsions	14·0	49·1	9·2	15·2	40·7	7·6
Disease of heart	5·2	18·2	3·2	11·8	31·6	5·9
Bronchitis	2·0	7·0	1·2	13·5	36·2	6·5
Pneumonia	10·9	38·2	7·0	18·7	50·1	9·2

Once more, in the First Annual Report (p. 116) he says: "It may be laid down as a general principle, that whenever the proportion of deaths from phthisis, compared with the total deaths, is high, the absolute mortality is low, and that the absolute mortality from phthisis itself is low. . . . The deaths out of the living express the real tendency to phthisis." In

the Hastings district, the deaths attributed to phthisis in the ten years, 1845-54, were about sixty-two annually, or more than 16½ per cent. of the total deaths, a high proportion compared with the whole of England; and therefore, as the average mortality of Hastings is low, agreeing with the former part of Dr. Farr's law. To the latter clause, which requires "the absolute mortality from phthisis itself to be low", Hastings forms an apparent exception; for it appears that in the same period 31½ out of every thousand of the population died of phthisis annually, which is a larger proportion than is carried off by this disease throughout the whole of England. The exception, however, to Dr. Farr's rule is probably only apparent, and admits of an easy explanation, when it is borne in mind that the deaths from phthisis in Hastings are swelled enormously by the large number of strangers who die of this disease, which, in fact, constitutes more than one-third of the whole.* But the deaths occurring among strangers will be specially noticed below. It will be seen that each of Dr. Farr's laws rests upon the same two facts, viz., 1, that the number of deaths from phthisis, by far the most fatal disease in his catalogue, varies comparatively little in different seasons and localities; and, 2, that in unhealthy years and places, the excessive mortality is caused principally by the deaths in the zymotic class. These facts furnish the solution to the third of his statements mentioned above, which is expressed almost like a paradox or riddle. The inquiry into the actual number of persons that are annually carried off by different diseases and classes of diseases is more important.

The deaths occasioned by zymotic diseases in the ten years 1838-47 was 3·16 per 1,000 annually, and in the ten years 1845-54 they were 3·49 per 1,000. The lowest mortality from this class was 1·46 in 1844; the highest was 8·18 in 1849, in which year the cholera carried off many labourers who were then engaged in making a railway at Hastings. This rate of mortality is low when compared with all England, and still more so when compared with the generality of *town* districts. The slight increase in the rate of mortality in the *second* decennial period is probably due entirely to the cholera in 1849, in which year the deaths from this disease amounted to 2·66 per 1,000. Of the most fatal diseases of this class, the mortality from small-pox, scarlatina, diar-

* *Total* average deaths from phthisis, about 62; average deaths from phthisis among *strangers*, about 24.

rhœa, and fever, is low; that from measles and hooping-cough is rather high. Small-pox was epidemic in 1839 and 1850; during nine consecutive years (1840-48) no death was attributed to this disease. Measles was epidemic in 1838, 1841, 1845, 1849, and 1850; scarlatina in 1839 and 1840; hooping-cough in 1839, 1843, 1847, 1849, 1850, 1853, and 1854. Two diseases in the zymotic class were more fatal in the second decennial period than in the first, viz., diarrhœa and fever (including under this name all the common continued fevers of this country*). A similar increase of diarrhœa has been noticed throughout all England. The only known cause for the greater tendency to fever is the rapid increase of population without a corresponding improvement in sanitary arrangements. Probably almost all the fatal cases referred to the zymotic class originated in Hastings; but with respect to small-pox, measles, scarlatina, and hooping-cough, it is so common for invalids to come to this place when just recovering from these diseases and still capable of infecting others, that it is rather a matter of surprise that the town should ever be free from them.

The second class (diseases of uncertain or variable seat) occasions about one death annually among every thousand of the inhabitants—a proportion which differs very slightly from the average mortality throughout England. The only name in this class that deserves special notice is "dropsy," to which more deaths are attributed in the first decennial period than in the second. This would seem at first sight to imply a decrease either in the frequency of the disease, or at least in its severity; but it does in fact only indicate an improvement in pathological science, and greater care in registering the causes of death; many deaths, which would formerly have been attributed to "dropsy," are now more correctly assigned to disease of heart, liver, kidneys, etc.

The fourth, or tubercular class, is the most numerous of all; and, next to the zymotic, the most important. The proportion of deaths attributed to this class in the first decennial period was annually 5·42 per 1,000, in the second it was 4·41; but, as in the case of dropsy, just mentioned, this does not indicate any diminution in the frequency of these dis-

---

* Dr. Mackness (*Hastings Considered as a Resort for Invalids*, p. 44) has overlooked this sense of the word "*typhus*" in the Reports of the Registrar-general, and has therefore fallen into serious error by affirming that "this fatal and dreadful malady has been about nine times less frequent at Hastings than the usual average in other parts of England". It is true that the mortality from fever (or *typhus*) is comparatively low in Hastings, but not by any means to the extent stated by Dr. Mackness.

eases, or any improvement in our mode of treating them. The decrease arises entirely from the vagueness and ambiguity of the word "*consumption*," which term is now less frequently used than formerly, and is employed in a more definite and scientific sense. The deaths assigned to phthisis in the last ten years amount annually to 3·15 per 1,000, which is a high rate of mortality, attributable (as has been said above), in a great degree, if not entirely, to the number of strangers who die in Hastings of this disease. It would be very desirable to know the proportion of *bonâ fide* inhabitants who are carried off by phthisis; but this it is impossible to discover, as we have no means of knowing how many of the persons enumerated at the last census were visitors, and how many were residents. This difficulty applies to all places much frequented by visitors; but there is another, which is peculiar to Hastings, Torquay, and other similar localities, which is fairly stated by Dr. Mackness, viz., the numerous individuals "who, having resided several years at Hastings on account of impaired health, are considered as inhabitants, but who originally came from other places, with a constitution highly predisposed to tubercular disease" (p. 68). The highest rate of mortality from phthisis during the last seventeen years was 5·20 per 1,000 in 1843; the lowest was 2·54 per 1,000 in 1853; but it must be borne in mind that the former number is undoubtedly exaggerated.

Hydrocephalus (which, though classed exclusively among the tubercular diseases, certainly comprehends many cases of simple effusion after inflammation) appears to be somewhat more fatal in Hastings than in all England, though probably not more than in other towns. It would also seem to have been more fatal in the first decennial period than in the second; but this diminution of numbers is due to the improvement of registration effected by the introduction of the forms for medical certificates in 1845, as is the case with dropsy, phthisis, and some other diseases.

The deaths from diseases of the nervous system are comparatively less than throughout all England. There is a great difference in the number of deaths caused respectively by apoplexy and by paralysis, which, throughout the whole of England, and also in the several registration divisions, are nearly equal: possibly this discrepancy (if not accidental) may depend partly on the medical certificates, and partly on the classification of the certificates.

"Convulsions" is rather a vague term as a cause of death even now, and was formerly used still more indefinitely:

accordingly, we find that the proportion of deaths attributed to this disease in the first decennial period was higher than in the second. The number of children carried off by convulsions in Hastings appears to be considerably less in proportion than throughout all England,—a fact of some importance, when we remember that this is one of the diseases especially influenced by dirt and wretchedness.

The deaths from disease of the heart, etc., are (comparatively) rather less numerous than throughout all England. They have greatly increased in number in the second decennial period, but this is merely owing to the greater facility with which disease of the heart is now distinguished: no doubt, many of the deaths that would formerly have been attributed to *dropsy* are now entered under *disease of heart.*

The deaths from diseases of the respiratory organs have increased during the latter decennial period, but are less numerous than throughout all England; as is also the case with each of the principal diseases, bronchitis and pneumonia. It may be noticed (what perhaps would hardly have been expected) that among those who die of these diseases in Hastings the number of strangers is comparatively small.

The deaths from diseases of the digestive organs were nearly equally numerous in each decennial period, and rather less numerous than throughout all England. None of these diseases require any special notice, nor do any of the other classes in the statistical nosology, except that the deaths attributed to old age have been gradually becoming less numerous,—another fact indicating improved skill in detecting disease, and greater care in registering the true cause of death.

REPORT ON THE SANITARY STATE OF THE CITY AND BOROUGH OF CANTERBURY, PARTICULARLY DURING THE YEARS 1854 AND 1855.

By GEORGE RIGDEN, M.R.C.S., Surgeon to the Canterbury Dispensary.

THE city of Canterbury, the capital town of East Kent, is situated in latitude 51° 17′ north, and longitude 1° 4′ east, and is the centre of a large and extremely fertile district, producing principally hops and grain, which give employment to a numerous and generally healthy peasantry. The city is noted for its beautiful cathedral, and for its numerous remains of the ancient British, Roman, and medieval ages. It has three markets in the week, which are well supplied with

live stock, vegetables, and grain. Although within the last century it has been the seat of a numerous silk weaving population, this branch of industry has been removed to other and distant localities, and it can scarcely now be said to have much pretension to be ranked as a manufacturing city.

Geology. Canterbury is situated in a valley on the river Stour, which passes through it, for the most part, from the south-west to the north-east direction; this river rises above Ashford, and after the addition of many springs to its stream becomes a goodly river. On its approach to Canterbury, it branches off into two streams, the one by Westgate to Dean's Mill, and thence to a point below Barton Mill. The other portion of the stream passes through the centre of the city near East Bridge Hospital, where it is crossed by King's Bridge, and continues its course to supply the Abbot's Mill, immediately below which it has a connecting branch with the other stream; after which it continues to Barton Mill, and shortly after unites with that branch which passes under Westgate, and in one stream glides on to Sturry. It will thus be seen that one part of the city is an island. At one time this river must have been a magnificent one, extending as it did from what are now hills on either side, and varying from one to two miles across.

Standing upon the left hand side of the bank at Whitehall, about a mile above Canterbury, it is at once seen that this river has found its passage through the chalk, the extreme limit of whose range is well seen at this point on the left side; but in a line from thence to the foot of the hill, called St. Thomas's hill, and to St. Stephen's, chalk is found under the alluvial. Thus, at St. Dunstan's cutting for the railway, chalk was found, as also at the brewery of the Messrs. Flint in St. Dunstan's, under the bed of the river at several points, both right and left of the city towards Sturry. On the right bank or side of the city the chalk rises into hills of considerable altitude, which attain their summit beyond Nackington, on a road leading to Swadling and just beyond Heppington, where is a circular mound of trees, visible at many points near the western and northern portions of Canterbury. The other side of this mound passes rapidly into a valley, through which the Nailbourn and lesser Stour pass, and, finding their way to Bridge, Littlebourn, and Ickham, finally join the Canterbury river; the united waters of these streams enter the sea at the Sandwich haven. Still remaining at the same place, the left hand side of the bank at Whitehall, a more remarkable feature presents itself; namely, that on the

left hand. As soon as the chalk disappears, we meet with the London clay, of which the high ground of St. Thomas's Hill, St. Stephens, Hale's Place estate, forms the meeting of the chalk and London clay, whilst on the right of the city we have alluvium covering the chalk; then the grand mass before described, but also a series of clays, gravels, and sands, that belong to the so-called plastic clay, and which conceal the chalk from view. Thus, St. Martin's Hill, the barracks, and passing down to the right of the stream towards Sturry and Fordwich, are all on the plastic, while, as before stated, the opposite bank on the left is wholly on the London clay. The proof of this is that, at the digging for the Whitstable tunnel, after passing a bed of sand, the clay with its corresponding fossils, lignite, and gypsum, were abundantly found. The same has recently occurred in the sinking of a well at the Clergy's Orphan Asylum, St. Thomas's Hill, where, after piercing through three feet of gravel, nine feet of yellow clay, with indurated nodules of clay interspersed, forty-seven feet of blue clay, with septaria, seven feet of imperfect clay stone, seventy-four feet of sand, and five feet of fossil bed, consisting of sand with venericardia, etc., water was abundantly procured, which rises in the well to within one hundred and twenty-two feet six inches from the surface. Thus it will be seen that the river Stour at Canterbury passes through a gorge across the main line of the chalk hills, for the highest point of the chalk is on the left hand as we advance up the river. The elevation of the chalk must have taken place before the river flowed in its present bed, for the stream could never have forced its passage through a range of chalk hills from one to two hundred feet high; indeed, upon examining the inclination of the strata, it is evident that, at some prior period, the chalk has been upheaved, which leaving other portions depressed, has allowed the water to find its course between its principal altitudes. Canterbury is therefore situated upon the chalk near the edge of the London basin, and also in part upon the beds of the plastic clay, whilst the whole of the centre is placed upon alluvial or modern *débris*.

Elevation. The city is reported to be from twelve or fifteen feet at its lowest, to about forty feet at its highest level above that of the sea, and there is no difficulty in procuring water by wells pierced into the chalk at any part of its area.

Water Supply. The city is supplied with water from the river generally, but also in part from the Water Company, who pump it from the river above the town into tanks at the

top of the old Norman castle, where it is filtered and supplied to the tops of most of the houses. The water from the north-west, that is collected by the drainage from the tableland of the London clay, is mostly allowed to run to waste; but that on the south-east, collected from the plastic, is most excellent, and furnishes a constant supply to taps in the chief thoroughfares in the city. On the two sides of St. Martin's Hill are reservoirs; those on the south supply the city generally; those on the north afford a supply to the cathedral precincts. In addition to these public works, many of the houses have wells attached to them, which, being pierced into the chalk, afford an ample supply of water, excellent to the palate, but containing considerable portions of lime, which is freely deposited upon the base and sides of the vessels in which it is boiled; this is not the case with the soft water supplied from the reservoirs on St. Martin's Hill.

In a city so long inhabited as Canterbury, it may be imagined that the accumulated matter of centuries is not a pure stratum through which to obtain a good wholesome water; and if such should find passage into the good water from the chalk wells, the water becomes deteriorated, and even the cause of disease. Such cases have occurred in Best Lane, Burgate Lane, and in Cotton Mill Lane, within a few years.

Drainage. It is to be regretted that greater advantage has not been taken of the natural inclination of the surface upon which Canterbury is situate to effect a good system of drainage. Although with but few exceptions its streets are supplied with underground drains, generally of sufficient calibre, these have unfortunately been constructed at different periods and upon no systematic plan; they are therefore placed upon various and uncertain levels, and thus in many places produce impediments to the regular flow of refuse liquids, and often emit, particularly at the numerous cesspools, most offensive and even poisonous gases.

Houses and Streets. The houses, for the most part built of brick, and the streets, are generally well adapted to the wants of the population. The higher class houses, situated on the more rising ground, are also well ventilated and dry; but the abodes of the poor are but cottages, and are generally situated upon the lowest level of the city, where the ground is at all times damp, not only from the nature of the soil, but from the occasional overflowing of the river, produced in a great measure by the large corn-mills impeding the natural flow of its waters, and thus causing the saturation of the earth. Hence arise much misery and disease among the population who inhabit these localities.

Value of House Property. The houses in the poor-law district of Canterbury are rated to the poor at their full probable annual net value, on which a shilling in the pound is levied four times in the year; this—including that upon the land within the boundary—produces the annual sum of £8,000. About 53 per cent. of the houses are rated at less than £5 a year each.

Burial Grounds. With the exception of those in the parishes of St. Dunstan's and St. Martin's, the parish burial grounds have lately been closed by an order in Council. To meet this event, and for the purpose of affording greater accommodation, a public cemetery of about four acres was purchased and consecrated about five years since; a small piece of ground of about half an acre, unconsecrated, has also been made available for the same purpose. These are said to be still capable, according to the present rate of mortality, of affording ample space for the next six or seven years. The municipal authorities, under a power invested in them, have now in contemplation either to purchase more ground contiguous to that already consecrated, or to establish another cemetery at the opposite side of the city.

Population. The population of Canterbury, according to the last census, was 18,398 inhabitants, giving an increase of 3,025 in the preceding twenty years. The rate of increase, however, is very uncertain, in consequence of the variable number of military stationed in the barracks, which, at the date of the last census, contained but a very small number, whereas in the two years reported upon in the tables they had been more than usually filled. There has evidently been so slight an increase in the resident population of the city, that it is impossible to estimate with any degree of exactness the actual population at any intermediate date. In reporting the comparative mortality to the number of persons living, it seems desirable to deduct the military in barracks and their mortality, and also the proportion of patients in the Kent and Canterbury Hospital not belonging to the city and their mortality; this will give us, according to the last census, a population of 17,958 resident inhabitants, and the average annual number of deaths 2·37 per cent. This, there is no doubt, represents a somewhat higher proportion than the reality; for, although in the years 1854 and 1855 there was more than the usual rate of mortality, exception should be made for the possible increase, however small, of the resident population, and also for the number of strangers usually attendant upon a full garrison, who are necessarily obliged to live out of the barracks, but cannot be

separated from the resident population. This is the more manifest from the great excess which has occurred in the parishes of St. Mary's Northgate and St. Gregory's, which are the most contiguous to the barracks, and in which this class of persons mostly take up their temporary residence.

Occupation. The poorer classes of the city are mostly employed in agricultural pursuits; the wages for which, although but moderate in amount, are generally sufficient throughout the year to enable them to provide their families with the necessaries of life; in addition to which, the seasons of harvest and hop-picking oftentimes enable the families to lay by a little store against the requirements of winter.

Proportion of Poor. In consequence of certain parts of the city forming portions of two other poor-law unions, it has been impossible to form an estimate of the proportion of poor to the aggregate number of inhabitants in the entire city. There is reason, however, for supposing that, while the greater number of the population may be so estimated, these may be considered a fair criterion by which to judge of the whole.

That portion of the city included in the poor-law union of Canterbury comprises a population, according to the last census, of 14,100 inhabitants; of these, there were upon an average weekly in 1854, 119; and in 1855, 108 paupers, including 6 imbeciles or idiots, receiving in-door relief. In 1854 there were 439, and in 1855, 450 paupers, including 8 having medical relief only, and 24 non-resident paupers having out-door relief, as the weekly average. In addition to these, upon a weekly average, 6 lunatics were maintained in an asylum; and 27 vagrants, although not, strictly speaking, the poor of Canterbury, were upon a weekly average receiving temporary relief from its rates. Of these latter, in the year ending March 31st, 1856, 1,275 made application, and were relieved at the trifling cost of £5 : 11 : 10.

It has not been in my power to ascertain whether this number of paupers is large or small in proportion to the total number of inhabitants; but it is more probably the latter, inasmuch as, by referring to the return of expenses made to the assistant poor-law commissioner for the year ending Lady-day 1855, it appears that the weekly cost per cent. of population for maintaining the poor is less in Kent than in Cambridgeshire, Essex, Norfolk, or Suffolk, with which counties it is associated; and also that the cost per cent. of population in Canterbury is as nearly as possible the average of that in the entire county of Kent.

(To be continued.)

PROGRESS OF EPIDEMICS.

LOCAL REPORTS OF EPIDEMIC AND ENDEMIC DISEASES

During the Months of March, April, and May, 1856.

Place.	County.	Lat.	Long.	Observer.
Teignmouth -	Devonshire -	50.32 N.	3.29 W.	W. C. Lake, Esq.
Odiham - -	Hampshire -	51. 8 N.	1. 3 W.	J. M'Intyre, M.D.
Canterbury -	Kent - -	51.17 N.	1. 4 E.	G. Rigden, Esq. James Reid, Esq.
Chatham -	Kent - -	51.24 N.	0.14 E.	F. J. Brown, M.D.
Putney - -	Surrey - -	51.28 N.	0. 3 W.	R. H. Whiteman, Esq.
Up. Holloway	Middlesex -	51.32 N.	0.03 E.	W. B. Kesteven, Esq.
Wanstead -	Essex - -	51.32 N.	0. 2 W.	F. Collins, M.D.
Saffron Walden	Essex - -	52. 3 N.	0.12 E.	T. Spurgin, Esq. H. Stear, Esq.
Bedford - -	Bedfordshire -	52. 8 N.	1.51 W.	T. H. Barker, M.D.
Sharnbrook -	Bedfordshire -	52.12 N.	0.40 W.	R. S. Stedman, Esq.
Newpt. Pagnell	Buckinghams.	52.10 N.	0.41 W.	G. O. Rogers, Esq.
Wellingbro' -	Northamptons.	52.20 N.	0.40 W.	B. Dulley, Esq.
Thetford -	Norfolk - -	52.26 N.	0.45 E.	H. W. Bailey, Esq.
Wisbeach -	Cambridgesh.	52.39 N.	0. 5 E.	W. H. Hole, Esq.
Pontesbury -	Shropshire -	52.43 N.	2.50 W.	Wm. Eddowes, Esq.
Nottingham -	Nottinghamsh.	52.50 N.	1.10 W.	T. Robertson, M.D.
Burton-on-Trt.	Staffordshire -	52.53 N.	1.53 W.	S. Thomson, M.D.
Wrexham -	Denbighshire -	53. 2 N.	3. 1 W.	E. Williams, M.D.
Hawarden -	Flintshire -	53.11 N.	3. 2 W.	T. Moffat, M.D.
Lincoln -	Lincolnshire -	53.12 N.	0. 5 W.	S. Lowe, Esq.
Alford - -	Lincolnshire -	53.15 N.	0. 6 E.	R. U. West, M.D.
Gainsborough	Lincolnshire -	53.23 N.	0.47 W.	D. Mackinder, M.D.
Liverpool -	Lancashire -	53.24 N.	2.59 W.	Thos. Bickerton, Esq.
Bolton - -	Lancashire -	53.35 N.	2.19 W.	W. H. Pendlebury, Esq.
York - -	Yorkshire -	53.58 N.	1. 3 W.	W. Procter, Esq.
Wst. Auckland	Durham -	54.45 N.	1.40 W.	G. Todd, Esq.
Rothbury -	Northumberld.	55.25 N.	1.50 W.	E. C. Summers, Esq.

QUARTERLY STATEMENT—No. VI.

[*The dates denote that the disease appeared in the weeks then ending.*]

SCARLET FEVER.

Teignmouth..May 2 [May 9, 30
Odiham..All March, April 4, 18, 25,
Canterbury..All March, April 18, 25, May 9, 30
Chatham..Every week except Mar. 7
Up. Holloway..Mar. 28, April 4, 18
Wanstead..May 30
Saffron Walden..Mar. 28, May 16
Sharnbrook..Mar. 7-21, April 11-25,
Newport Pagnell..May 30 [May 16-30
Wellingborough..All Mar., April 4-11
Thetford..March 7
Wisbeach..All March, April 4
Pontesbury..All April, May 2-23
Nottingham..March 7, 28, April 4-11, May 30
Burton-on-Trent..March 7, April 11
Wrexham..Every week
Lincoln..April 18, 25, May 2
Gainsborough..April 18, 25, May 2
Liverpool..Every week except April 18
Bolton..All March, April 25, May 9, 30

MEASLES.

Odiham..Every week
Canterbury..Every week [9-23
Chatham..Mar. 7-21, April 4, 25, May
Up. Holloway..All April
Sharnbrook..Every week except Mar. 7 and May 10

Newport Pagnell..April 11-18, May
Wellingborough..April 18-25 [23-30
Nottingham..Every week
Wrexham..Every week
Alford..May 9
Liverpool..Every week except Ap. 18
Bolton..Mar. 28, April 11, all May
York..March 28, April 18

SMALL POX.

Canterbury..Mar. 7-21, Ap. 4-11, May 9
Chatham..Every week except Mar. 7
Putney..May 2 [and May 23
Bedford..March 7
Newport Pagnell..May 9
Wellingborough..Every week
Burton-on-Trent..May 23
York..Mar. 21, April 4-11, May 2, 16

HOOPING COUGH.

Teignmouth..Mar. 14, 28, all April,
Odiham..Mar. 21, Ap. 11 [May 2, 16
Canterbury..Every week [2-30
Chatham..All Mar., April 11-18, May
Putney..All March, April 4-18 [May
Up. Holloway..Mar. 7-14, Ap. 18, all
Wanstead..Mar. 14, April 11, May 16
Saffron Walden..Every week
Thetford..April 11-25, May 2
Wisbeach..Every week
Nottingham..Every week
Lincoln..March 7-21
Alford..March 7-14, May 9, 23-30
Gainsborough..All March, April 4-18
Liverpool..Every week
Bolton..Mar. 21-28, April 4, May 9-30
York..Mar. 7, 28, Apr. 11-25, May 2, 23
Rothbury..Mar. 28, Apr. 4-11, May 30

CROUP.

Canterbury..March 14-21, April 11,
Chatham..Mar. 7, April 18 [May 9
Putney..May 2
Upper Holloway..March 21
Bedford..April 11
Sharnbrook..March 28, April 4
Wisbeach..March 21, 28 [May 9-23
Nottingham..Mar. 14-28, April 4-18,
Wrexham..May 2, 9
Gainsborough..April 25 [May 2, 9
Liverpool..March 28, April 4, 11, 25,
Bolton..March 7, 21

CATARRH.

Teignmouth..Every week except May
Odiham..Every week [23
Canterbury..All March, May 2
Chatham..Every week
Putney..All Mar., May 16 [May 2-16
Up. Holloway..March 28, April 4-11,
Wanstead..March 7
Saffron Walden..Every week
Bedford..April 11
Newport Pagnell..All April, May 2-9
Wellingborough..All March and Apr.
Thetford..March 7, 14, 28, April 4, 11, 25, May 2-16
Wisbeach..All Mar., Apr. 4, May 23-30
Pontesbury..All March [May 2, 16-30
Nottingham..All March, April 11-25,
Burton-on-Trent..All Mar. and April
Wrexham..April 11-25, May 2-9
Alford..March 21
Gainsborough..Every week
Liverpool..Every week
Bolton..All Mar., April 25, May 2-9
York..Mar. 14, 28, April 25, May 2
Rothbury..May 9-30

INFLUENZA.

Teignmouth..Every week except Apr.
Odiham..Mar. 7, 21, Apr. 11-18 [4 & 25
Chatham..All March, April 4, 11, 25, May 16-23
Putney..All Mar., Apr. 4-18, May 2
Wanstead..Mar. 7-14, Apr. 4-11, 25, May 9-16
Saffron Walden..Every week
Bedford..April 11-25, May 9-23
Sharnbrook..All March and April
Newport Pagnell..All April and May
Wellingborough..Every week
Thetford..March 7-14, 28, April 4-18, May 2-16
Wisbeach..May 2-16 [May 2-16
Pontesbury..March 21-28, all April,
Nottingham..Mar. 7, Apr. 4, May 9, 30
Wrexham..Mar. 21-28, all April, May
Hawarden..April 4 [2-9
Lincoln..March 7-14 [and 23
Liverpool..Every week except May 16
York..Mar. 14, Apr. 11-18, May 2-23
West Auckland..Every week

CHOLERA.

Liverpool..May 30

AGUE.

Canterbury..Mar. 7-14, all April, May
Chatham..Every week [9, 23
Bedford..April 18, May 2, 16, 30
Sharnbrook..May 2-16, 30
Newport Pagnell..May 2
Wellingborough..April 25, all May
Thetford..Mar. 21-28, Apr. 25, May 23
Wisbeach..Every week
Alford..May 30

ERYSIPELAS.

Teignmouth..March 21-28, April 18
Odiham..Mar. 14, April 4 [May 2
Canterbury..Mar. 7, 21-28, Apr. 11-18,
Chatham..Mar. 14-28, Apr. 4, 25, May
Putney..April 25 [2, 9
Saffron Walden..April 18
Bedford..May 9
Sharnbrook..May 30
Newport Pagnell..April 11, May 2

Thetford..Mar.14-28, Apr.11, 25, May
Wisbeach..Mar. 21-28, Apr. 4 [16
Pontesbury..Mar.7-21, Apr.18, May 23
Nottingham..April 18, May 9-23
Burton-on-Trent..Mar. 14, 28, Apr. 11
Hawarden..Mar. 21, April 4
Lincoln..May 23, 30
Alford..May 30
Gainsborough..April 11-25
Liverpool..April 11, May 9, 30
Bolton..March 14, 28, all April
West Auckland..May 16-30
Rothbury..May 2

REMITTENT FEVER.

Teignmouth..All April, May 23-30
Odiham..Mar. 7, Apr. 4-11, May 2, 30
Canterbury..March 14-21
Putney..All March, May 9, 23-30
Upper Holloway..April 18-25
Saffron Walden..April 4-11, May 9-30
Sharnbrook..Mar. 14-28, April 4, 18, May 9
Newport Pagnell..All April, May 2
Thetford..Mar. 14, May 2, 23 [16-30
Wisbeach..Mar. 28, all April, May
Nottingham..May 23
Burton-on-Trent..April 18
Alford..May 16-23 [May 9, 30
Liverpool..All Mar., Apr. 4, 11, 25,
Bolton..April 18-25, May 2
York..Mar. 28, Apr. 4-11, May 2-16

DIARRHŒA.

Teignmouth..Mar. 21-28, Apr. 4, 11,
Odiham..May 9, 30 [25, May 2, 9, 30
Canterbury..Mar.7-21, all April & May
Chatham..Every week except May 9 and 23
Putney..All March, April 4, 18
Upper Holloway..Mar. 28, April 4
Wanstead..Mar. 7, 21, April 4
Saffron Walden..Apr. 25, May 9-30
Bedford..March 7, 21, April 4, 18, May 9-30 [May 21, 30
Sharnbrook..All Mar., Apr. 4, 18, May
Newport Pagnell..All April, May 2, 9, 23, 30
Wellingborough..All March and Apr.
Thetford..All March, Apr. 11, 25, all May [2-9
Wisbeach..Mar. 14-28, Apr. 4-11, May
Pontesbury..March 7-14, April 25, May 16
Nottingham..Apr. 18-25, May 9-30
Burton-on-Trent..April 25, May 9
Hawarden..All Mar. and Apr., May 16
Alford..Mar. 21, May 16-30
Gainsborough..All March and April, May 2, 9 [May
Liverpool..Mar. 14-28, April 4, 25, all
Bolton..Apr. 4-11, 25, May 2-9, 23
York..March 21, April 4
Rothbury..April 11, May 2-16

DYSENTERY.

Odiham..Mar. 14-21, May 9-16
Chatham..May 9
Saffron Walden..April 25
Bedford..May 16, 23
Newport Pagnell..Apr. 11-25, May 2-9
Thetford..May 23
Nottingham..March 14, May 2, 23
Liverpool..May 23, 30
Bolton..April 25, May 2, 9

TYPHUS.

Teignmouth..March 21, April 11-25,
Canterbury..Every week [May 2
Chatham..Mar. 14-28, Apr. 4, 25, May
Putney..Apr. 18, May 9 [2, 9, 23
Upper Holloway..March 28
Wanstead..All March
Saffron Walden..Mar. 14-28, Apr. 18, 25, all May
Bedford..Mar. 7, 21, Apr. 4, 18, 25,
Sharnbrook..April 4 [May 2, 16
Thetford..Mar. 7, 25, April 4, 11, 25,
Pontesbury..Mar. 7, 14 [May 2, 30
Nottingham..March 14, May 2, 16
Gainsborough..Every week
Liverpool..Mar. 21-28, Apr. 4, 11, 25, all May
West Auckland..All March and Apr.,
Rothbury..Mar. 7-14 [May 2

PUERPERAL FEVER.

Odiham..May 9
Chatham..April 11, May 2, 9
Bedford..April 25
Thetford..March 7, 28
West Auckland..Mar. 7-21, May 2-23

CARBUNCLE.

Odiham..May 30
Canterbury..Every week
Chatham..April 25
Putney..May 9
Saffron Walden..May 2, 16
Sharnbrook..April 4, 18
Newport Pagnell..May 23, 30
Thetford..Mar. 14, April 11, May 23
Wisbeach..March 7, 14
Burton-on-Trent..Mar. 14
Liverpool..Mar. 7-14, 28, April 18-25, May 2, 9, 23, 30
Bolton..March 28, April 11
York..May 2
Rothbury..April 18

NEURALGIA.

Wrexham..Every week

RHEUMATIC FEVER.

Wrexham..March 28, April 4, 11, 25, all May

ADDITIONAL OBSERVATIONS.

Teignmouth.—Mr. Lake writes: "The easterly winds, commencing on Feb. 28, blew, with the exception of March 5 and 19 to 21, till April 2, and principally from the N.E.; from this date till the 13th the wind was westerly, chiefly S.W.; from April 13 to May 11, with the exception of two or three days, it was again from the east, variably N.E. and S.E.; from May 11 to 28 westerly winds prevailed. No rain fell from Feb. 20 till March 16, a period of twenty-five days; from 16 to 18, 2·071 inches fell, but only 0·022 from that date till April 1. The mean barometric pressure for March was 30·075; mean maximum temperature, 47·2; mean minimum temperature, 36·9; mean humidity, 78; mean ozone, 3·1. The first half of April was showery, but not warm; the latter half coming in with very strong easterly winds, was at first bleak, then fine and bright, the sun being hot and the air cold. Mean barometric pressure for April was 29·686; mean maximum temperature, 53·9; mean minimum temperature, 40·9; mean humidity, 79; mean ozone, 5·2; total rain fell, 3·483 inches. The latter part of April and the month of May presented much variation of temperature; the first days of May were very cold; for a few days in the middle of the month the temperature was almost that of summer; it again declined considerably in a few days time, and the latter part of the month was showery and close, but not pleasantly warm.

"The most prevalent complaints were catarrh, also pleurisy and hooping-cough; one case of the last-named disorder was followed by extensive and fatal gangrene of the right cheek, involving its whole substance. Cases of chicken-pox occurred at intervals through the quarter. The cases of fever, both in children and adults, partook of the bilious type, in some with a tendency to engorgement of the head. Conjunctivitis was of somewhat common occurrence in the middle weeks of April, and tonsillitis in the latter half of April and first three weeks of May. Several cases of glandular inflammation and abscess occurred in children, principally during the month of May."

Odiham.—Dr. M'Intyre says: "Disease has considerably increased during the last quarter. The cases of scarlet fever were acute. Several of them were followed by anasarca of a severe character, and in two of them death occurred. The case of puerperal fever terminated fatally. The labour was in every way natural; the patient (whose first labour this

was) was a school-mistress, aged twenty-seven, with exhausted nervous energy from over-taxed brain. Bronchitis and pneumonia have been prevalent."

Canterbury.—Mr. Rigden writes: "During the past quarter, the prevailing epidemics have been measles, hooping-cough, and catarrh. Cases of typhus have been under treatment during each week; a few cases of scarlet fever continue to shew themselves occasionally; and there have been also some cases of small-pox, but no case of this disease has come under my observation during this period. The bills of mortality for Canterbury show deaths from measles, hooping-cough, erysipelas, fever, scarlet fever, and dysentery in March; small-pox, measles, hooping-cough, fever, erysipelas, and diarrhœa in April; measles, scarlet fever, hooping-cough, catarrh, and fever in May."

Mr. Reid also has forwarded us the following valuable returns, which have been drawn up by the Epidemiological Committee of the East Kent and Canterbury Medical Society.

"*Abstract of Meteorological Observations for the Spring Quarter*, 1856.

	March.	*April.*	*May.*
	Deg.	Deg.	Deg.
Lowest temperature in the day time	32	37	42
Highest	47	53	60
Mean	38·86	50·58	50·70
Lowest temperature in the night	24	29	34
Highest	44	47	55
Mean	35·23	40·33	44·54
Lowest reading of the barometer	29·68	29·07	29·23
Highest	30·43	30·12	30·00
Mean	29·98	29·598	29·649
Amount of rain in inches...............	0·37	3·27	4·19

Direction of wind (the number indicates the number of days certain winds prevailed)..*March*—N. 5, N.E. 9, E. 9, S.E. 1, N.W. 2, W. 4, S.W. 1; *April*—N.E. and N. 15, S.E. 2, S. 5, S.W. and W. 8; *May*—E. 8, N.E. 6, N. 4, N.W. 4, S., W., and S.W. 15.

"*March.* The comparison of this month with the months of the winter-quarter, shows that it was colder than either February or January, and that it ranged next to December in temperature. Vegetation, which began to push forwards in the latter part of February, was checked, and the few leaves that had appeared became brown and shrivelled at the edges. The only considerable fall of rain was on the 18th.

"*April.* On the 15th, 16th, and 17th, the valley of the Stour, and a portion of the flat part of the town, were flooded. This generally occurs when a N.E. wind blows strongly during, or immediately after, any considerable fall of rain. The inclination of the valley and the stream of

water of the river is such, that it is probable that if all mill-dams and obstructions were removed, or even if the system of drainage were more complete, the city might not be liable to these injurious inundations. Rain fell during thirteen days this month, and on seven consecutive days; a severe thunder storm on the 30th.

"*May*. On the 8th, 9th, and 10th, the N.E. wind prevailing after a considerable fall of rain, the valley of the river was again flooded. Rain fell on twenty days during the month, at more frequent intervals than last month, the whole amount being greater by ·92 of an inch.

"The alternate impulse and check which has marked the progress of vegetation during the quarter has tended to produce a more equal degree of development; thus, the lime, beech, and elm trees, have pushed forth their buds and leaves each in its natural advance to a certain extent, but all more nearly together.

"*Abstract of the Returns of Zymotic Diseases during the Spring Quarter.*

"The number of cases of zymotic disease reported during the spring quarter has been 166. The greatest number of these were in the S.W., or upper part of the valley, district of the city; the next highest number in the N.W., or lower part of the valley, district; and in the third district, the E. or higher part, the smallest number. The mortality in the whole number was at the rate of 6·62 per cent., and was caused by measles, hooping-cough, scarlet fever, and small-pox.

"*Small-pox*, which appeared to have nearly worn out in the last month of the previous quarter, has furnished thirteen cases during the present quarter. Only three of the persons attacked were vaccinated, and these had it in a mild and modified form. Some of the remainder had the disease in a severe confluent form, and in one instance, a child three months of age, the disease was fatal.

"*Measles* have continued to prevail, but the monthly returns show that the number attended has gradually declined each month. The mortality has been at the rate of 4·38 per cent., chiefly from the complications of diseased lungs. One child, an emaciated subject, who had suffered from diarrhœa for eleven weeks previously, succumbed directly to the disease; another appeared to have died from phthisis quickly following the pneumonia from measles. Some instances of inflammation of the trachea, persisting for three or four days, were noticed; and several instances of irritation of the mucous membrane of the stomach and bowels were observed.

It is also mentioned, that in several infants and children under two years of age the ordinary coryzal symptoms were either absent or very slight, though the eruption was well defined.

"*Hooping-cough*, next to measles, has been most observed. Generally, only the worst cases of this disease come under treatment, so that it is difficult to attain a proper criterion of its prevalence, and the mortality is estimated at too high a proportion: thus in the cases observed, it has been at the rate of 18·18 per cent. The disease has been most frequently associated with, or consequent upon, measles. In one instance, death resulted from complication of tubercular disease of the mesenteric glands; another case, complicated with mesenteric disease, recovered. Two cases that recovered were complicated with diarrhœa.

"*Scarlet Fever* still occasionally appears; six cases are reported during the quarter, two of which were fatal, one from convulsions.

"*Fever*. No fatal case of this disease has been reported. Thirteen cases have been returned, two of which were complicated with severe head symptoms, and two with vomiting and bilious symptoms.

"*Ague* is generally more observed during the spring at Canterbury, though it is seldom absent altogether at other periods of the year. The type of the cases reported has been chiefly tertian, no case seems to have been protracted, though one is observed to have a tendency to relapse.

"*Diarrhœa* has been noticed by one or two observers as existing to a greater degree than usual at this period of the year. Disorders termed bilious seemed to be more prevalent than usual at the beginning of the spring. Mr. Rigden, the surgeon of the dispensary, observes, that during May several instances of furunculoid disease had presented themselves, and that there appears to be a tendency to diarrhœa amongst the population of Canterbury."

Chatham.—Dr. F. J. Brown writes: "During the last sanitary quarter (March, April, May) the wind was easterly on fifty-four days. The spring is backward, but vegetation has been making rapid advance for several weeks past. Scarlatina, measles, variola, and hooping-cough, have been epidemic; so also has been influenza. Erysipelas, ague, and diarrhœa, have prevailed. I know of three cases of metria that occurred in April and May; also of one case in a cow, for the week ending 30th May. Inflammatory affections of the mammæ have been numerous. Hæmorrhage in hooping-cough I have observed."

Putney.—Mr. Whiteman says: "Hooping-cough was the

most prevalent disease of the zymotic class during the earlier portion of the quarter. The mortality, however, was not great. Many cases of remittent fever were treated during the month of March, especially in the undrained districts; and two cases of typhoid fever of a severe character occurred in April and May in the same localities. Diarrhœa was unusually prevalent in March, but the cases were none of them very severe or protracted, for the most part readily yielding to one or two doses of the nitrous acid mixture, employed by me so extensively and with such satisfactory results during the epidemics of 1849 and 1854. This town has been unusually free from severe and fatal disease since the construction of the main sewer in the High-street. It is the undrained localities that have yielded almost all the fatal cases for some time past. The sanitary measures that have been adopted under the Metropolis Local Management Act are beginning to manifest their good effects, particularly on the rate of mortality. When the sexton and parish clerk complain of a decrease in the amount of their fees, we may be pretty sure that some good influences are at work in improving the public health."

Upper Holloway.—Mr. Kesteven says: "The case of typhus is the first I have met with in Upper Holloway within a period of fifteen years. I have met with several unusually severe cases of varicella in May."

Wanstead.—Dr. Collins says: "The typhoid fever continued up to the last week in March, the total number of cases attended during January, February, and March, being seventy; the mortality, three. Since March the neighbourhood has been very healthy, excepting cases of influenza and hooping-cough of a mild kind, and one case of scarlatina."

Saffron Walden.—Mr. Spurgin says: "From the dry state of the atmosphere, notwithstanding the prevalence of north-easterly winds, the forepart of the quarter was healthy, but since that time indisposition has increased from the absence of solar heat, and augmented humidity of the air. Vegetation has been retarded from the same causes, but is now looking healthy and luxuriant."

Mr. Stear says: "Hooping-cough has been very prevalent; many adults have been suffering from it. I have attended several cases of infantile remittent fever lately."

Bedford.—Dr. Barker writes: "During the quarter ending May 30th, a few isolated cases of small-pox, croup, catarrh, and erysipelas, have occurred. We have had cases of ague, influenza, diarrhœa, dysentery, fever, and neuralgia,

more particularly in the latter half of the quarter, but they have not been very numerous."

Newport Pagnell.—Mr. Rogers says: "The only case of small-pox that I am aware of was that of a young girl who *had* been vaccinated. It was severe; and the patient is marked. There is no idea as to the cause of infection. Some cases of measles have been very severe; but I have had no fatal case. I think the most prevalent diseases have been varieties of neuralgia. The wind has been principally N. and N.E. Latterly there has been a great deal of rain. Vegetation is luxuriant."

Wellingborough.—Mr. Dulley writes: "Of scarlet fever I have had but few fatal cases; in one, the efflorescence was very slight and transient, reappearing at intervals with threatening peritonitis; inflammation rapidly spread to the throat; sloughing of the fauces and tonsils occurred, and was followed by death on the fifth day. In the same neighbourhood there was another case with great pericardial oppression, much relieved by the full development of the rash; the recovery was slow. The cases of ague were confined to railway labourers."

Thetford. Mr. Bailey makes the following report. "The continuation of the mild weather, the undeviating state of the atmospheric pressure, together with the comparatively high temperature, and the little amount of rain and wind, during the commencement of this quarter, have occasioned less disease than usually occurs at this period. The specific epidemic diseases, which have so long visited us, have entirely left the town. Only one case of scarlatina has occurred, which was accidentally brought here by a poor family travelling the country, and which terminated fatally. The few cases of hooping-cough occurring in April seemed only the recurrence, from the cold weather, of former attacks, and which speedily gave way to medical treatment. Catarrhal affections have been very general, arising from the vicissitudes of temperature, and in some instances requiring assistance. Influenza has frequently occurred during the quarter, in old persons it has been fatal; and bronchitic affections with children have been extremely prevalent, requiring most active treatment, and fatal in three cases. Pleurodynia, in the labouring classes, have been extraordinarily prevalent, disabling them from work. These cases have been attended with but slight cough, no fever, considerable pain upon inspiration, and increased by the motion of the arms in walking. Bleeding, etc., have given the most decided relief. As is

usual at this period of the year, we have many cases of pleurisy and pneumonia amongst the working poor, but which gave way to the usual treatment. Erysipelas has been more general than usual, I have never known it more so; whether arising from contagion is doubtful, as the cases appear to be isolated. Thirteen cases have come under my notice. During the last month, there have been great vicissitudes of temperature and more unequal atmospheric pressure, and the dew point higher than the average. This state has given rise to ague, remittent fever, and typhus, chiefly occurring in those who, from peculiarity of circumstances, are unable to resist these changes. They evidently do not arise from want of cleanliness, ventilation, or bad sewerage, but, in my opinion, from atmospheric causes. These have required the utmost attention, and although protracted in their course, have terminated favourably. From the same causes I attribute the numerous cases of diarrhœa which have occurred during the quarter, attacking all grades of society and accompanied by great abdominal pains, sickness, and smart fever; in children, three deaths have occurred. Two cases of puerperal peritonitis have come under notice, some days after delivery, which ultimately did well; and one case of phlegmasia dolens. Rheumatism has been more general than usual the last month, from exposure to cold and in those predisposed to the disease. This has given way to large doses of bicarbonate of potash, as recommended by Dr. Garrod. The casual diseases of the quarter are, hæmorrhage, paralysis, tic-douloureux, syphilis, dyspepsia, leucorrhœa, neuroses, consumption, and some cutaneous diseases."

Record of Deaths extracted from the Registrar's Book.

March.		*April.*		*May.*	
Hydrocephalus	1	Hooping cough	1	Consumption	4
Debility	1	Debility	4	Pneumonia	1
Dropsy	1	Convulsions	3	Atrophy	3
Paralysis	1	Atrophy	1	Decay of nature	1
Pneumonia	1	Consumption	1	Hooping cough	2
Lying-in	1	Dropsy	2	Hydrothorax	1
Atrophy	2	Decay of nature	1	Debility	1
Hooping cough	2	Puerperal fever	1	Diarrhœa	3
Old age	1				
Aneurism	1				
Drowning	1				
Ossification of heart	1				
Burn	1				
Kick from a horse	1				
Scarlatina	1				
Convulsions	1				
Bronchitis	3				
Accident	1				
	22		14		16

Wisbeach. Mr. Hole writes :—“ Hooping-cough, ague, and remittent fever have been very prevalent this quarter. There has also been more diarrhœa than is usual at this season of the year. The changes of temperature have been great and very sudden. The wind has been chiefly east and north-east. The district is not healthy now.”

Pontesbury. Mr. Eddowes says :—“ In the latter end of May, one family was seized with scarlet fever ; six children had it. Before the youngest, a child at the breast, was seized, the mother had erysipelas of the face ; one eye was swollen up. As she was getting better, the baby was seized with scarlet fever and erysipelas ; one eye completely swelled up and the other nearly so. They all recovered.”

Nottingham. Dr. Robertson writes :—The principal diseases here have been those involving the respiratory organs, measles, hooping-cough, and catarrh. The two former have been very fatal: forty-one persons having died from the former, and thirty-five from the latter, during the quarter. I subjoin the usual meteorological and disease report (for the former of which I am indebted to the courtesy of Mr. White of the General Hospital).”

	March.	*April.*	*May.*
Barometer maximum	30·37	30·01	29·92
,, minimum	29·51	28·92	29·27
,, mean	27·77	29·34	29·41
Temperature maximum	51·2	64·2	68·4
,, minimum	29·8	31·3	31·5
,, mean	40·6	45·3	50.3
Total amount of rain	0·70	1·11	1·26
Prevailing direction of wind	N.E. & N.	SE. & E.	NE. & W.
Mean amount of ozone	7	8	7
New cases of disease	345	298	268
Number of deaths	147	127	140

Burton-on-Trent. Dr. Spencer Thomson says :—“ The quarter ending May 30th has, on the whole, been healthier than the previous one, the most prevalent diseases being catarrhs and bronchitic attacks during the east winds.”

Lincoln. Mr. Lowe says :—“ This quarter has been more than usually free from epidemic and endemic diseases ; a few sporadic cases of scarlet fever, hooping-cough, influenza, croup, and erysipelas having occurred in April and May.”

Alford. Dr. West says :—During the past quarter, I have had many cases of low pneumonia, complicated often with remittent fever and diarrhœa.”

Gainsborough. Dr. Mackinder reports :—“ There has been an epidemic of mumps this quarter, but of so mild a character

as to require scarcely any medical treatment. Its infectious nature was clearly demonstrated in our workhouses, into which a woman and child were admitted with the disease on the 29th of April. On the 2nd of May, two children were affected; 3rd, eleven; 8th, two; 11th, one; 22nd, two. A few cases only of typhoid fever, acute rheumatism, and bronchitis have occurred in this locality, notwithstanding the cold north-easterly winds of March and April, and the cold, rain, and ozone of May."

The subjoined meteorological report has been furnished by Mr. Dyson:—"The months of March and April were remarkable for the dry state of the atmosphere and the cold, dry winds which prevailed. Only a quarter of an inch of rain fell in March, and two and a half inches in April. May was cold and damp; rain fell on twenty days, and the amount collected was nearly five inches. Ozone was very freely developed during May, the test-paper being deeply tinged nearly every day; the two previous months were as remarkable for the absence of ozone, except at distant intervals. The whole quarter was unusually cold, the first two months dry, and the last wet. A genial change occurred the first week in June. In consequence of the rain which fell in May, vegetation was early and luxuriant."

Liverpool.—Mr. Bickerton sends the following report:—"March 15th, 1856. During the last week there have been only 211 deaths registered. Diseases of the zymotic class caused 47 deaths. Of these there died from scarlatina 11; measles, 2; hooping-cough, 15; diarrhœa, 5; typhus, 4; small-pox, 1; syphilis, 1. Diseases of the lungs caused 75 deaths; 16 fewer than in last week. A female servant died at the age of 100. The temperature of the week has been very low, cold easterly winds prevailing.

"March 22, 1856. The number of deaths registered has been 251; an increase of 41 over last week. The increase in the week was owing in a great measure to the prevalence of easterly winds and colder weather, as well as to the increased number of deaths from scarlatina. Diseases of the lungs caused 96 deaths; scarlatina, 22; hooping cough, 13; diarrhœa, 8; measles, 7; typhus, 4; syphilis, 4; small-pox, 9. Gout produced one death; the patient was aged 66.

"March 29. There have been two hundred and thirteen deaths registered. Zymotic diseases caused fifty deaths. There were fewer deaths from diseases of the lungs than in last week, though easterly winds have prevailed with slight

frosts at night; the variations, however, have been slight. The temperature for the week has been about one and a half degree below the average.

"During the quarter ending March 29, 1856, the number of deaths from all causes was 3,145, being 326 fewer than occurred in the same quarter of last year. They may probably be accounted for by the milder temperature in this than in last year. On the average the temperature in this quarter has been about six degrees higher than in the same quarter of last year. The comparative mortality in the two quarters shows a very material difference in the deaths from chest affections. In the first quarter of 1856 diseases of the chest caused 1685 deaths; while in the corresponding quarter of 1855 there were 2095 deaths—a difference of 410. Zymotic diseases caused this quarter 744 deaths, and in quarter just preceding 1093 deaths, there being a decrease in all diseases of this class, excepting pertussis, from which there has been a very great increase, causing 224 deaths, a larger number than in any previous quarter. The mortality from measles was 66, in the preceding quarter it was 153. Scarlatina also fell from 447 deaths in the preceding quarter, to 200; diarrhœa, from 112 to 65; typhus, from 96 to 60, being a less number than any previously known in Liverpool; the deaths from syphilis fell from 24 to 13; variola caused 17 deaths during the quarter.

"April 5. The deaths from all causes during the week have been 207; 239 being the average for the preceding eight years. The deaths from scarlatina have been 8; from measles, 8; from hooping-cough, 8; from typhus, 3; from erysipelas, 3; from tracheitis, 2; from diarrhœa, 1; from syphilis, 1; from small-pox, 1; diseases of the chest caused 81 deaths; intemperance, 2.

"April 12. The continued prevalence of fine mild weather exerts a very favourable influence upon the health of the town. The amount of sickness and death has been below the average; 211 deaths occurred in the borough, 225 being the average; scarlatina caused 7 deaths; measles, 10; hooping-cough, 16; typhus, 6; syphilis, 4; influenza, 1; small-pox, 1 (not previously vaccinated); diseases of the lungs caused 72 deaths.

"April 26. The weather during the past week has been very fine and seasonable, and the amount of disease has been less than usual. There were 194 deaths. Scarlatina caused 7 deaths; measles, 5; tracheitis, 6; hooping-cough, 5; typhus, 3; small-pox, 2; syphilis, 2; mumps, 1; purpura, 1;

rheumatism, 3 (one, a girl ten years old; one male, twenty-three; and another forty-four years old); diseases of the lungs caused 68 deaths.

"May 3. There has been much unseasonable weather during the last seven days, it having been cold, with easterly winds prevailing. The number of deaths, however, has been considerably lower than the average, only twice during the last nine years has it been so low as in the past week. The total number of deaths in the borough during the week was 180, being 42 less than the corrected average for the preceding eight years. Scarlatina caused 6 deaths; measles, 3; typhus, 6; hooping-cough, 6; tracheitis, 4; diarrhœa or dysentery, none. Diseases of the lungs caused 73 deaths.

"May 10. There has been a continuance of cold disagreeable weather, with the wind fixed, either east or east north-east, much more like March than May weather. Hence most people have been complaining of common cold, chapped hands, and cracked lips. To day, however, true May weather has commenced. The number of deaths has been 180, being 40 below the average of the corresponding week in previous years. Scarlatina caused 4 deaths; measles, 7; typhus, 8; hooping-cough, 7; diarrhœa, 3; small-pox (not vaccinated), 1; syphilis, 6. Chest affections produced 56 deaths, viz., phthisis, 32; inflammatory affections of lungs, 24. Of the 180 deaths, 90 were males, 90 females; 83 adults, 97 children.

"May 17. The total number of deaths during the past week has been 178, the average being 222. Scarlatina caused 7 deaths; typhus, 6; hooping-cough, 6; diarrhœa, 3; measles, 2; syphilis, 1. Diseases of the lungs caused 75 deaths, there having been 56 last week. One death was caused by excessive drinking. Mean temperature, 52; average of preceding years, 53·7. Rain fell on four days.

"May 24. There have been during the past seven days 211 deaths registered in the borough, being 14 less than the corrected average, but 33 more than in the previous week. Scarlatina caused 13 deaths; measles, 9; typhus, 12 (being the greatest number in any week in the present year); hooping-cough, 6; diarrhœa, 6; small-pox, 2; syphilis, 2. There were 66 deaths from diseases of the lungs. A girl, six years old, died from sea sickness. There have been only three deaths registered in West Derby ward, with a population of 29,000.

"May 31. Mild weather has prevailed during the past week. There have been registered 181 deaths, being thirty fewer than in the preceding week. There were from scarlatina, 3 deaths; measles, 10; hooping-cough, 9; typhus, 5;

small-pox, 3; diarrhœa, 4; syphilis, 1; English cholera, 1. Diseases of lungs caused 72 deaths. The temperature has been very mild and fine.

"The following is a return of all the inquests held before the borough coroner, P. F. Curry, Esq., during the year 1855. It will be seen that sudden deaths and deaths by violence occur more frequently amongst the uneducated than the educated classes. Of 1935 witnesses examined, only 681 were able to sign their names to the depositions.

Accidentally killed	159
" scalded	29
" burnt	51
Excessive drinking	34
Injuries, how received no evidence	23
Children found exposed stillborn	16
Infanticide by persons unknown	8
Natural causes	187
Found drowned	41
Accidentally drowned	21
Suicide during temporary insanity	14
Felo-de-se	4
Children accidentally suffocated in bed	65
Wilful murder	9
Manslaughter	8
Other causes	36
Total	705

Number of inquests	705
Number of days on which inquests were held	196
Number of jurors who signed the inquisitions	2352
Number of jurors who wrote their own names	3138
Number of jurors who signed with their mark	214
Number of witnesses examined	1935
Number of witnesses who wrote their own names	681
Number of witnesses who signed with their mark	1254

Expenses of witnesses, and car fares for jury, in the year 1855, £433 : 19 : 9.

Bolton.—Mr. Pendlebury says: "During the past quarter, cases of scarlet fever have been both fewer and milder; whilst those of measles have been evidently on the increase. There has been a tendency (as in the preceding quarter) to mucous inflammations, sometimes arising from apparently slight causes. Cases of erysipelas have been numerous. In two or three instances, the erratic form has been observed after vaccination of young infants. In other respects, the general health of the community has been satisfactory."

York.—Mr. Procter writes: "The cases of small-pox were, with one exception, in adults, all of whom had been vaccinated. Hooping-cough has been very prevalent and severe. The cases of influenza were characterised by neuralgic pains of the head, face, and neck; the bronchial symptoms were not severe. The cases of remittent fever

were generally in young people. The mean temperature has been in March, 37·4; in April, 44·1; in May, 47·0."

West Auckland.—Mr. Todd says: "Many cases of abscess occurred during the progress of the epidemic of continued fever; they principally occurred in the back, and in the upper and lower extremities, and in malignant cases. This epidemic of continued fever arose from paludal sources, and in many cases was propagated by contagion. The fever that had its origin in *marsh miasmata* did affect others by infection or contagion."

Rothbury.—Mr. Summers writes: "In the cases of hooping-cough, all the patients were children who came from a distance for the sake of change of air while suffering from the disease. Though they mixed freely with other children who had never had hooping-cough, in no case did it spread to the latter. Throughout the quarter there has been a great tendency to asthenic complaints. Boils and abscesses have been of frequent occurrence. I have noted one case of actual carbuncle, and one of erysipelas, which ended in extensive sloughing of the skin and cellular tissue. The season in this district is very backward, with continuance of cold easterly winds and much rain."

SANITARY LEGISLATION.

Our report on sanitary legislation must of necessity be very brief; and, indeed, there is not much to communicate.

BILLS.

The Nuisances Removal Bill for Scotland has been revised, and so remains.

A Bill to amend the Public Health Act of 1848 has been brought in by Mr. Cowper and Sir George Grey, and printed. Its provisions are too important to be treated of here cursorily.

A Bill, intitled an *Act to amend the Smoke Nuisance Abatement* (*Metropolis*) *Act*, brought from the Upper House, provides that certain glass-works and furnaces in the metropolis, and steam-vessels above London Bridge, shall, after Jan. 1, 1858, be no longer exempt from the operation of the said act.

A Bill to Amend the Burial Acts, prepared by Mr. Massey and Sir G. Grey, suggests that the General Board of Health shall be substituted for the Secretary of State, for the purposes of burial acts; that burial boards may provide more

than one burial ground; that local boards of health may, by order in Council, be constituted burial boards.

RETURNS.

A Return from the General Board of Health, shows that the Public Health Act has been applied during the years 1854-55 to the following towns:—Plymouth; Haworth, Yorkshire; Aberdare, Glamorganshire; Bishop Auckland, Durham; Willenhall, Staffordshire; Over Darwen, Lancashire; Crumpsall, Lancashire; Arnold, Notts; Heanor, Derbyshire; Wanstead, Essex; Garston, Lancashire; Houghton-le-Spring, Durham; Barton-upon-Irwell, Lancashire; Burley, Yorkshire; Malton, Yorkshire; Middlesbrough, Yorkshire; Windhill, Yorkshire; Christchurch, Monmouthshire; Keighley, Yorkshire; Tunstall, Staffordshire; Toxteth Park, Lancashire; Romford, Essex; Wilton, Wiltshire; Eccleshill, Yorkshire; Tipton, Staffordshire; Mistley, Essex; Redcar, Yorkshire; Wellingborough, Northamptonshire; and Smethwick, Staffordshire, in 1856. Portions of the act have also been incorporated in local acts in the following places:—Bolton, Lancashire; Burnley, Lancashire; Kingston-upon-Hull; Ryde, Isle of Wight; Wellington, Salop; and Shrewsbury.

REPORTS.

A Report on the Cholera Epidemics of London, as affected by the consumption of impure water, has been brought out by Mr. Simon. We are surprised to find one deep blot in this report; but whether it be a sin of omission or commission we will not pretend to say. We hope the former. Here is the complaint. The report, as far as it goes, tends conclusively to establish the correctness of those views on the propagation of cholera, which Dr. Snow was the first to originate, to announce, and in the midst of violent opposition, amounting even to ridicule, to prove by a series of statistical and personal inquiries, carried on by his own unaided industry and at immense pecuniary cost. To suppose that Mr. Simon was not acquainted with the labours of Dr. Snow is absurd; yet in the report he has not once referred to that gentleman, nor acknowledged in an admitted discovery the worth of the discoverer. We hope Dr. Snow is careless to such slights, intentional or accidental. He may well be so. He has only to bide his time. His claims to originality are clear as noonday; and when in posterity the full influence of his labours are felt, his name will be accepted, as of one, who by genius for observation has conferred a signal and lasting blessing on his fellow-men. Then the slights of this poor, proud, paltry, selfish age, will be spoken of only as to his honour and to the truth of his mission.

THE

JOURNAL OF PUBLIC HEALTH.

OCTOBER 1856.

AIR AND VENTILATION.*

In reply to various communications and inquiries, we have from time to time supplied in the Journal of Public Health an epitome of various plans and suggestions, from different authors, bearing on the subject of ventilation. Such notes are, however, too scattered and general to be of direct service to the sanitarian inquirer; and we have therefore thought it would be a practical task, worthy some amount of labour, to review at length the subject of air and ventilation, and to place before the reader a paper on these points,

* Library of Illustrated Standard Scientific Works. Chemical Technology. Vol. i, Part i, Fuel and Its Applications. By Drs. Ronalds and T. Richardson. London: Baillière. 1856.

On the Defective Ventilation of Hospitals. By John Roberton, Surgeon. Manchester: 1856.

Observations on the Construction and Ventilation of Hospitals for the Sick. By John C. Steele, M.D., Superintendent of Guy's Hospital. Glasgow: 1856.

Medical History of the Niger Expedition. By J. O. McWilliam, M.D., Senior Medical Officer of the Expedition. London: Churchill. 1853.

On the Movement of Atmospheric Air in Tubes. By W. D. Chowne, M.D. London: 1855.

On the Smokeless Fireplace, Chimney Valves, and Other Means for Obtaining Healthful Warmth and Ventilation. By Neil Arnott, M.D., F.R.S., F.G.S. London: Longmans. 1856.

Memorandum on Asiatic Cholera and Other Epidemics as Influenced by Atmospheric Impurity. By Neil Arnott, M.D., F.R.S. Report to Board of Health. 1854.

On the Ventilation of Lighting Lamps. By Professor Faraday. Paper read before the Institute of Civil Engineers, June 27th, 1843.

Aération et Ventilation des Hôpitaux, Prisons, et Habitations particuliers. Rapports Généraux des Travaux du Conseil de Salubrité. Paris: 1855.

Statical Essays, containing Hæmostaticks. By Stephen Hales, B.D., F.R.S. 2 vols. London: 1733.

The Physiological Phenomena of Mountain Sickness. By Stanhope T. Speer, M.D. London: Richards. 1653.

On Ventilation, and the Means of Determining its Amount. Lecture delivered before the Royal Institution. By H. Bence Jones, M.D., F.R.S. Reported in the *Chemist* for June, 1856.

Effects of Air on Human Bodies. By J. Arbuthnot, M.D. London: 1733.

Medical Works of Richard Mead, M.D. London: 1762.

to which he may afterwards turn, as to a literary resting-place, where may be found the histories of a few facts, and the index to more.

Dr. Arnott, in his excellent work on *The Smokeless Fire-place and Ventilation*, has made some admirable observations on the comparatively modern application of the principle of ventilation in public and private buildings. He shews that, a century or two ago, men were not even aware that the atmosphere was a "thing;" and that they have only become acquainted with this fact, as they have been taught that gases can be measured like water, and have learned some of the properties of the element oxygen, which the immortal Priestly discovered in the latter part of last century. Hence one of the essentials of life, a sufficiency of pure air, has been considered of little account.

It is to be regretted that, even now, although oxygen has been discovered, and gases have been measured like water, and Dr. Arnott has written a philosophy in simple style, no due importance is paid to the matter in hand by the public at large. Nay, it is further subject of regret that the medical profession as a body, advanced as it is, is not yet alive to the full extent, end, and meaning of efficient ventilation in its applications to the promotion of health and the treatment of disease. Old traditions, fancies, and fables linger yet around the Esculapian priest; still the alarm about chills and draughts perplexes; and still the danger to the patient of leaving his bed or his room in days of returning health, "lest a relapse be the consequence", is presented to the mind as a scarecrow, which need only be walked up to in a cool humour to be mercilessly and safely demolished.

The uses of air to man and his lower earthmates are not easily comprehended at first sight; they are so varied, and, to the uninitiated, so subtle. The effect of the ordinary atmospheric pressure on the body is a first essential to healthy life. It is by this pressure, exerted uniformly over every point of the body, that the corporeal framework is the more firmly knit together. We are, as it were, casts in moulds of air. Removed to a mountain height, where the atmosphere is lighter and the pressure diminished, the body suffers, to borrow a description from Dr. Speer, "with symptoms (varying in degree and number in different individuals) of vertigo, headache, dyspnœa, constriction of the chest, palpitation, syncopal tendency, oozing of blood from the mucous surfaces, increased rapidity of the pulse, nausea and vomiting, thirst, febrile tongue, muscular pain, sense of extreme de-

bility in the lower limbs, and general prostration of strength"—results arising, according to the same author, from a threefold source: congestions of the deeper portions of the circulatory apparatus, increased "venosity", in plainer words, impurity of the blood, and a loss of equilibrium between the pressure of the external air and that of the gases existing within the intestines.

The symptoms thus induced bear, in the opinion of Dr. Speer, a close analogy to those of an ephemeral fever: a remark of great importance in a physiological point of view.

Similar symptoms may be produced in animals, by the removal of a portion of the atmosphere from a vessel in which they are confined, and in other ways. If, for instance, to the ordinary pressure of the atmosphere on the body some general mechanical pressure be added, such as the application of a moderately tight bandage to a limb, the artificial compression is tolerably well borne when evenly applied. But if such bandage be now rapidly removed, the relief is painful, the blood rushes into the recently contracted vessels, the skin becomes red, and a painful tingling sensation is, for a moment or two, experienced. If this artificial pressure be extended to the whole body, these results are more striking. They represent, in a minor degree, the effect of removing the atmospheric pressure. Note the following:

The holy Fathers of the Inquisition, of blessed memory, in the gentleness of their natures, and with surpassing ingenuity, had an interesting physiological experiment of this nature for chastening the erring sons and daughters—specially the daughters—of Eve. To wit, they swathed the bodies of their sinners very firmly from foot to shoulder, and when this pressure was just tolerable, they suddenly removed it. The result supplied the soul-healing chastisement. The pain of relief was exquisite; the prostration decided; while the febrile warmth which succeeded gave an admonishing foretaste of what all sinners might ultimately hope for who should offend the inquisitorial and priestly will.*

But to return: there is another use to which the ordinary atmospheric pressure extends. Under its influence the lungs are kept charged with air. When the chest is expanded in the act of inspiration, the pressure of the atmosphere causes the lungs to fill with air, and to follow up the expansion of the walls of the chest. During the act of expiration, on the other side, the entrance of external air into the lungs

* See Arbuthnot, On the Influence of Air on Animal Bodies, p. 43.

is, in a great measure, prevented for the moment, and the external air itself becomes the recipient of the expired gases.

Thus, the mechanical effects of atmospheric pressure on the body are most important, and the effects of extreme variations of pressure are well mapped out by certain striking symptoms. How far the effects of those lesser variations of pressure which occur at ordinary levels, and which are indicated by ordinary barometrical changes—how far these exert a physical influence on the body, is as yet a question open to an extended series of observations and experiments.

A second important use of the atmospheric air relates to its influence on the animal temperature in a physical point of view. As the heat made in the body passes off from it at every point by radiation, it commingles, to use a common term, with the atmospheric medium in which the body is encased. Thus, if the external atmosphere be cooled far below the level of the body, then the radiation of the animal heat is so vigorous, that an arrest of vitality, more or less marked, according to the degree of cold, becomes necessarily manifest. A great variety of physiological changes in this case supervenes. Nutritive acts, which are dependent for their continuance on a full development of caloric, are impeded. The great chemical changes of respiration, the absorption of oxygen, and the evolution of carbonic acid, are reduced; internal congestions follow, and the circulation fails in power; lastly, the soft structures, losing their expanding principle, shrink, the capillaries contract, merely in all probability from the loss of caloric: and the whole of what in the aggregate sense may be called the vital forces are, in a greater or lesser degree, checked in their course.

On the opposite side, when the temperature of the external air is raised towards a level or above that of the body, the due radiation of heat is checked; then the reverse of the above conditions obtains. The nutritive and destructive changes of tissues are accelerated; the muscles are relaxed; the capillaries easily dilate; and the secretions are profuse, from the skin, the lungs, and the kidneys. But this exalted condition of body can no more be tolerated than the opposite, for any length of time. The chemical forces of life are here too actively engaged; they must be brought back to steadier play, or they will stop altogether.

The happy medium for equalising the temperature of the body is the atmosphere. We instinctively perform something for ourselves in this respect, in the use of clothes, of which

we put on more or less as sensation tells us. But it is our air garment, or mould, which does most. If this naturally retains an equality, its 60° to 70° Fahr., we are comfortable; if it, capricious, dance about from 32° or less up to 90° or more, we must put it under some certain rules,—must confine it in sections, in rooms where we live, and artificially warm it in the first case; must give it free vent, and lower its temperature by agitation, in the second case. Upon a due consideration of these facts the science of warming and ventilating rooms and buildings essentially depends; as does also the manner of clothing the body, so as best to enable it to meet the vicissitudes in the temperature of the enveloping air.

But the atmosphere does yet more in the way of aiding and abetting the body to live. It removes from the body its volatile refuse, and distributes this refuse into space.

Dirty individual living in St. Giles's may eschew water, and go to his grave with the solid refuse of his *corpus insanum* sticking to him so closely, that dust is added to dust in more senses than one; said individual has not, however, the same power of retention over his own volatile refuse, which is too bad—at all events in a free country. For the inexorable atmosphere, blowing at him wherever he goes, will have its dues from him in shape of carbonic acid, water, ammonia, and what not—will have them, we say, will sweep him clean of them, as far as it is possible. Twenty cubic inches of impure air from the lungs at every expiration must needs be yielded; about as much, says Dr. Arnott symbolically, as would make up the bulk of a full-sized orange, if it could be seen—which is not the case, all for a wise purpose. For if dirty individual, street-crossing sweeper perchance, could see himself thus blowing off an orange, or anything like it, some twenty times a minute, and gulping in another as often, he would inevitably think the task an imposition, and shirk some part of it, as soon as his first alarm was over. Therefore, for obvious and cogent reasons, the work is invisibly, but not less surely, done; there is an escape from the body of the impure vapour already described, while a supply of pure vapour, oxygen and nitrogen and water, equal altogether to the loss implied, is taken in.

But let us follow (keeping to Dr. Arnott's peculiar simile) the "orange" as it is evolved. Having left the chest and got out of doors, it rises just as a soap-bubble would, or a balloon; for being itself at the moment of expulsion heated to nearly the temperature of the body, viz., 96 degrees Fahr., it is of lighter density than the atmosphere, floats up in it, be-

comes diffused, and is at last, by wide spreading, brought to nought.

Dirty individual aforesaid may, if he will, " think of this when he smokes tobacco." There is something more philosophical in smoking a pipe than the vulgar are aware of; for, as the curling fumes ascend from the lips and evanish in mid air, do they not afford to the learned eye a clear view of the " orange", do they not paint the breath sky blue, and shew better than all Dr. Arnott's diagrams of oil and water, and tubes and valves, that air is a " thing"? We ask pardon of the Anti-tobacco Society for this absurd digression.

As, then, the heated vapour from the breath escapes, it rises, and a purer proportion is inspired. What becomes of the invisible " orange" thus thrown off, and why it does not come back, in part at least, direct on the head of the individual, is due to the principle of " diffusion", on which a word must be said.

When two liquids of different densities are put together—say oil and water—they do not remain long in the happiness of a united pair. The oil, taking advantage of the density of the water, floats to the top, and makes for itself a very comfortable water-bed, where it reclines uncontaminated, as all may see. But if two gases of different densities, such as carbonic acid, a heavy gas, and hydrogen, a light gas, be mixed together, they continue mixed, as free gases be it observed, but commingled freely; nay, if a jar of light gas be inverted over a jar of heavy gas, so that the two gases are brought thus simply into communication, the two at once agree to unite in the most friendly fashion. The heavy gas politely rises, the light gas gallantly descends, and in the end there is a complete admixture—brandy and water are not more accommodating to each other.

The discovery of this tendency on the part of one gas to diffuse into another gas was made by Dalton, sandal-maker to the immortals, and himself immortal cobbler, who pushed his argument by demonstration so far, as to lay down a kind of axiom to the effect, that gases of different kinds and densities afford no resistance to each other, but run into each other as they would into a vacuum; and although the labours of Professor Graham have shewn that the diffusion process takes place in different gases with different degrees of rapidity, and that gases are not absolutely vacua to each other, yet the final result is the same as though they were; since it has been proved that gases do, in fact, rush into a vacuum with velocities corresponding to the numbers which have

been found to express their diffusion volumes, *i. e.*, with velocities inversely proportional to the square root of the densities of the gases.

Of the cause of this mutual diffusion of gases we are not so clear. There is yet another great law to be discovered in this direction. But it is sufficient for our present purpose to know the fact, that no gaseous matter can be set free, whether from the animal body or from aught else, without being at once freely diffused in the great ocean of the atmosphere, as though practically it were being spread through a great vacuum.

It is impossible to overestimate the magnificence of meaning implied in this grand natural law. This great aerial sea, forty-five miles deep each way from any point of the earth's surface, and into which we insignificants can but raise ourselves with the help of bricks and mortar some few poor hundred feet; nay, into which our madcaps who try to pierce heaven on a wind-bag cannot penetrate more than a mile or so; this great aerial sea, how competent for the end had in view, how capacious a chamber for the distribution of coal smoke, human breath, volcano vapours, and poisons innumerable, from soothing nicotina out of dirty individual's lips in St. Giles's, to concentration of irrespirables from the top pot of the St. Rollox, far north!

And, lastly, the winds must not be forgotten. Think of winds—great agitations of great atmosphere in the great chamber, always mixing up everything on the large scale, as if some enormous Maelström were perpetually at work in the universe; but all in order, all according to the first law—Order. The wind movements, however, and all the effects of admixture springing out of them, must be carefully removed from the diffusion process. That is to say, there must be no relationship of cause and effect introduced between them. None such exists. The diffusion process is a fact *per se*, it takes place in air in a state of rest, the same as when such air is in a state of motion.

There is a fourth, and yet more important use of all, which the air around us plays in regard to the men and animals who live at the bottom of it, as at the bottom of an immense air lake or sea. The scientific world now-a-days recognises air to be a food, as much a food in its way as beef and potatoes in their way. The old saying about the chameleon,

> "Stretched at its ease the beast I viewed,
> And saw it eat the air for food,"

is thus no poet jingler's fancy, but a fact. Air is food;

the first food of man and of everything that lives. The chief sustaining element of the air inspired in breathing is the oxygen, which forms a fifth of the whole of the atmospheric sea. The nitrogen, which forms the remainder of the sea, and is usually said to be the mere diluting medium of oxygen, is, however, not altogether inert, for a small portion of it taken in by each inspiration is made use of, or at all events does not return in expiration. The quantity of air received into the lungs of the healthy man at each ordinary inspiration is about twenty cubic inches. This is but a small portion of that which he is capable of receiving, for his chest has a capacity for at least two hundred inches, when well filled, so that he has a reserve portion always in store,—a bank of air. The process of diffusion of gases is here also brought into play; for before the expired air leaves the lungs, the products of waste, which are to be cast off from the blood, are diffused into the air with which the lungs are steadily filled. This provision is admirable, in that it keeps the interchange of pure air for impure air in the lungs going on in one unbroken current, places the command of the respiratory act in a partial degree under the will of the individual, and prevents mishaps which might arise, such as the temporary suspension of respiration, from becoming immediately fatal.

The lungs in health are thus always charged with air; and this air, carried to the extreme ramifications of the air-tubes, and thence into the air-cells, of which there are in the human lungs about six hundred millions, is brought into indirect contact with the blood, which is circulating round the lungs from the right to the left side of the heart. We say indirect contact, because the air-cells are lined with membrane on their part, while the blood which plays over them is itself also enclosed in plexuses of vessels, almost infinitely minute, so that there is an intervening membranous screen between the air and the blood. Here, in this fine but expansive network of air-cells and blood-tubes, do the interchanges of air and blood take place through the membranes. Here the blood returning from all the body, through the right side of the heart, gives off its gaseous refuse; and here the same blood is reinvigorated by the absorption of oxygen and the small quantity of nitrogen already spoken of, with possibly some amount of water. The oxygen, if not the nitrogen, is *food;* and thus the process of respiration is another process of digestion. Going round with the blood to all parts of the body, this oxygen supports all the acts of nutri-

tion; helps to build up the new, assists to remove the old; the phenomena of life are, in fact, all described in the term oxygenation.

Springing out of these considerations, there is yet one other important fact to be considered in relation to air and man: we mean the generation of animal heat. We have seen that the atmosphere is the grand external medium for regulating the temperature of animal bodies; it is also the grand medium for supporting the temperature of these bodies. The process of animal heat-making is again a process of oxygenation, not specially carried on in the lungs, it is to be understood, but in every part of the body where oxygen enters into combination with tissue so as to give rise to a new combination. Of course there is heat liberated, when in the pulmonic system, the oxygen enters into its combination with the blood; but there is also heat produced in other combinations into which the free oxygen absorbed into the blood enters in its round of the general system; *i. e.*, in its unions there with carbon, with sulphur, and with phosphorus.

Thus, to epitomise, we see in the air a variety of uses. It affords mechanical support; it is a heat modifying medium; it swallows all gases exposed to it; it supplies a food to man, out of which he is in part built up; it feeds him with the active principle by which the warmth of his body is sustained.

Upon such simple processes as these, coupled with other processes for the supply of food through digestion, the whole system of organised life depends; and hence some writers have drawn an analogy between animal man and the steam engine, an analogy remarkable in all leading points.

"Allow us", says Dumas, in speaking of the vegetable world, as supplying the necessaries of existence, "allow us to borrow from modern science an image sufficiently grand for comparison with these grand phenomena, and to compare the actual vegetable world, the true magazine from which the animal world derives its elements, with that other magazine of carbon, formed by the ancient deposits of coal, and which, burned by the genius of Papin and Watt, has produced carbonic acid, water, heat, motion, one would almost say life and intelligence."*

Dr. Arnott also gives the following table of comparison:—

* Permettez donc, qu'empruntant aux sciences modernes, une image assez grande pour supporter la comparaison avec ces grands phénomènes, nous

"THE STEAM ENGINE IN ACTION	"THE ANIMAL BODY IN LIFE
Takes:	Takes:
1. FUEL, viz.—Coal and wood, both being old or dry vegetable matter, and both combustible.	1. FOOD, viz.—Recent or fresh vegetable matter and flesh, both being of kindred composition, and both combustible.
2. WATER - - - - - -	2. DRINK (essentially water).
3. AIR - - - - - - -	3. BREATH (common air).
And produces:	And produces:
4. STEADY BOILING HEAT of 212 degrees by quick combustion.	4. STEADY ANIMAL HEAT of 98 degrees by slow combustion.
5. SMOKE from the chimney, or air loaded with carbonic acid and vapour.	5. FOUL BREATH from the windpipe or air loaded with carbonic acid and vapour.
6. ASHES, part of the fuel which does not burn.	6. ANIMAL REFUSE, part of the food which does not burn.
7. MOTIVE FORCE, of simple alternate push and pull in the piston, which, acting through levers, joints, bands, etc., does work of endless variety.	7. MOTIVE FORCE, of simple alternate contraction and relaxation in the muscles, which, acting through the levers, joints, tendons, etc., of the limbs, does work of endless variety.
8. A DEFICIENCY OF FUEL, WATER, OR AIR, first disturbs, and then stops the motion.	8. A DEFICIENCY OF FOOD, DRINK, OR BREATH, first disturbs, and then stops the motion and the life.
9. LOCAL DAMAGE from violence in a machine is repaired by the maker."	9. LOCAL HURT OR DISEASE in a living body is repaired or cured by the action of internal vital powers."

We have recorded these general observations on the influence of air on animal bodies, because, in the absence of knowledge bearing on such subjects, it is impossible either to understand the objects of ventilation, or the means to carry out any efficient plan of ventilation. We have shewn that the air is of great service by the pressure it exerts; that it acts as a warmth modifier; that it disposes of gases and vapours; that it supplies nourishment to the body; and that it sustains the animal heat. These things considered, the importance of a free ventilation, of a steady current of pure air around the animal body becomes at once manifest to every mind. As in the steam engine so in the man, no movement, no action can be well done without the free vent of air.

Dirty individual of St. Giles's, removed from street crossing to stoke at a steam engine, polish it up and keep clear its breathing holes, is doing for his inanimate brother the thing he would scorn to do for his animate self. What if the iron horse were to demand a huge pipe and tobacco, and choke up his throat by volumes of smoke? Stoker, smoking his own

---

assimillions la végétation actuelle, véritable magasin où s'alimente la vie animale, à cet autre magasin de charbon que constituent les anciens dépôts de houille, et qui brûlé par le génie de Papin et de Watt, vient produire aussi de l'acide carbonique, de l'eau, de la chaleur, du mouvement, on dirait presque de la vie et de l'intelligence.

pipe the while, would call his inanimate brother a blockhead, and pull the huge pipe away, as a stupid interference with the due performance of iron horse respiration and activity.

Nomadic tribes, living mainly out of doors, or covering themselves in from the rain and wind in canvass tents, take and require but little care in regard to ventilation, since they interfere not with atmospheric laws. But when men begin to erect stone walls, to hedge themselves in from the atmosphere with impermeable barriers, and to pollute their confined dwellings with their own emanations, the matter is reversed. Supreme nature is defied, and the defiants pay the forfeit always visited on such delinquency. Under these circumstances the principle of ventilation, as it is called, has slowly been evolved out of nothing, and has suggested various ways and means by which the atmosphere may be made subservient to the designs and life methods of men. Even in the early days of architecture, when real stone or wood houses were first built, the necessity for any special attention to ventilation was uncalled for. In these days, when light was admissible into the building by means only of large open casements, the air went in with light, and was as freely diffused. In the old Roman house, with its *compluvium* and numerous unbarricaded windows, the ventilation must have been perfect and simple. But when it became the fashion to let in the light alone, and thus to cut off the air from the same entrances, then the evil effects of confined air in houses became a necessity, in the absence of some new means for its free admission and after removal. This inconvenience was felt the more in places where great numbers of people were placed together in one limited spot; as on board ship, in the wards of a hospital, the compartments of a prison, or even in the closely built streets of a town. What amount of disease, what amount of death, must have ensued for many centuries from absence of pure air, and whilst men were ignorant of the actual value of air in its relation to life and health, it is impossible to say.

For many ages after the days of the old Roman literature, little of worth is met with on the vital properties of air, and the importance of a free air current. For sound instruction on these points, the world had to wait for Dr. Hales, whose physiological labours are amongst the most remarkable records of natural science in the beginning of the last century. Unable, in his day, to make a correct analysis of air, Hales nevertheless succeeded in showing, with

remarkable correctness, the physical and even the chemical virtues of this gaseous material. He showed that air was a "thing;" he measured the 220 cubic inches of air which the chest can contain; he measured the number of cubic inches drawn in at each inspiration; he even approximated to the loss sustained in the lungs by the absorption of oxygen and nitrogen; whilst in his researches on the re-respiration of expired air, he describes unconsciously the physiological influence of carbonic acid.

With these facts before him, Hales was not slow to see the importance of free ventilation. "Thus", he observes, "what we call a close warm air, such as has been long confined in a room, without having the vapours in it carried off by communicating with the open air, is apt to give us more or less uneasiness, in proportion to the quantities of vapours which are floating in it. For which reason the German stoves, which heat the air in a room without a free admittance of fresh air to carry off the vapours that are raised, as also the *modern* invention" (A.D. 1733) "to convey heated air into rooms through hot flues, seem not so well contrived to favour a free respiration as our common method of *fires in open chimneys*, which fires are continually carrying a large stream of heated air out of the room up the chimney, which stream must necessarily be supplied with equal quantities of fresh air through the doors and windows, and crannies of them."

But we must follow Hales a step further. "Two gallons of air", he states, "breathed to and fro for two minutes and a-half become unfit for respiration. Whence no wonder", he continues, "that the air should be infected, and apt to breed distempers in close prisons, where not only the breath, but also the plentiful perspiration of many confined together stench the air, and make it apt to breed what are called gaol distempers, which inconvenience might in a great measure be prevented if gaols were so contrived as to have a free passage for the wind to blow through them, and thereby communicate fresh air, for want of which many of those unhappy persons are not only deprived of liberty in gaols, but too often of life also."

Speaking of the ventilation of ships, the same author refers to the old plan of washing the beams and decks with vinegar. This, he says, can never take the place of a thorough ventilating air; but "there may be a ferment between this acid and the then too alkaline air, which may thereby be reduced in some degree from its alkaline to a

neutral more wholesome state." Who told Stephen Hales about an alkaline air in crowded, unventilated rooms it is hard to say. We infer that Stephen was a fast philosopher.

Arbuthnot, following Hales, gave some sound views regarding pure air. The respiratory act he designates as "the second digestion", and comments upon the value of a healthy respiration in all disorders.

Sir John Pringle, in his important work on the *Diseases of the Army*, published in 1768, dwells with great emphasis on the importance of a free ventilation in hospitals. His rule for preserving the purity of such places is a sound one, viz., "to admit so few patients into each ward, that anyone unacquainted with the danger of bad air might imagine there was room to take in double or triple the number. I have generally found", he adds, "those rooms most healthful where, by broken windows, and other wants of repair, the air could not be excluded."

In the event of a room being deficient of a chimney, which, when present, acts as a constant ventilator, Sir John recommends the use of Dr. Hales' ventilators, and appends a note written by Dr. Hales on the manner in which these ventilators are to be applied. "A board was to be screwed fast to the upper part of a window on the outside of each room. This board was to have a round hole in it, and also the glass opposite to it, of a size sufficient to receive a trunk of a sufficient length to reach from the window *to a small ventilator* on the ground, through which the foul air was to be drawn out of each room, the fresh air entering in at the door. The same trunk would serve for windows of different heights by being placed more or less obliquely. A very small ventilator will be sufficient for this purpose—about five feet long and twenty inches wide."

The ventilators of Dr. Hales, here noticed, were a novelty in their day. They were not exactly new to the world, for the old Romans had invented a bellows for the ventilation of mines, of which Dr. Hales' machine was merely a modification, and hardly an improvement.

However, in the Hales ventilators, a revival was instituted, which the Royal Society had the privilege of hearing of in 1741.* The atmosphere was to be made now the slave of the builder. A man with mysterious bellows under his arm offered his assistance and even patronage to His veritable Royal Highness the Prince of the Power of the Air. His

* Dr. Hales was also the author of a "Treatise on Ventilators".

Highness was tickled at first, but objected to the interference when he found the man was in earnest.

The mysterious bellows themselves, called by their author in reference to their application to ships, "the ships' lungs", consisted innocently enough of a square box, divided transversely by a horizontal partition of wood. This partition, being supported by two hinges fixed in the centre of one of the ends of the box, admitted of being moved up and down at its other end by means of a rod, which passed through an opening in the upper side, or top of the box. At that end of the box to which the hinges of the centre partition were attached were four holes—two above, and two below the partition. These holes were armed with valves, the two upper ones opening—one inwards, the other outwards, the two lower ones opening also—one inwards, the other outwards. By this arrangement, whenever the partition within was moved up and down at its free end a change of air was established. As the partition went down, the air in the lower compartment was forced out in part through the valve opening outwards, while pure air was admitted into the upper compartment through the opening, the valve of which opened inwards. As the partition went up the action was reversed; but the result was the same. The machine was worked by the hand, and on board several men were employed to pump at intervals the impure air out of the lower parts of the vessel.

Another machine, an improvement on the Hessian bellows, was also invented about the same time by the Rev. Dr. Desaguliers.

The ventilation of Dr. Hales was applied extensively in the navy when first brought into notice; for Hales had influence at head quarters; was patronised by Prince Frederick; became the almoner of the prince's dowager princess; and might have been a bishop if his tastes had run in that high and mighty direction.

The ventilation, however, failed, for reasons which Dr. Arnott thus points out:—"The valve apertures were each only one forty-fourth part as large as the surface of the piston", and "caused expenditure of eighty-eight times the force that would have moved the air if there had been no such impediment. The labour implied in the working of Dr. Hales' machines led to their discontinuance."

Improving on this principle, Dr. Arnott has, in these days, invented a pump, which he calls the "single ventilating pump". Its action is exceedingly simple, and it

has been employed effectually on board the *Anson* convict ship.

To go back. Soon after the appearance of Dr. Hales' scheme, a new plan of ventilation was suggested by Mr. Samuel Sutton, which met with the approval of the distinguished Dr. Mead, and was submitted to the consideration of the Admiralty authorities in 1741. We notice this plan specially, because it introduces a systematic attempt to make a chimney a ventilating shaft. Mr. Sutton, in fact, made a discovery, which is here given,—Dr. Arnott being respectfully requested not to laugh until he has read the whole.

(Mr. Sutton *loq.*) "I at length found that by stopping the air out of a room that had three fireplaces, and making two large fires in two of them, I could bring the air to draw down the blind chimney" (syphon ventilation on a grand scale) "with such force as to put out a candle."

Pushing his experiments still further, Mr. Sutton concluded, "that a fire being always kept on board ship, and a pipe or cavity made to the well, one end of it being heated by fire, a change of air would follow, and by this means be rendered sweet and pure and fit for respiration."

In the application of this scheme to the ventilation of ships, Mr. Sutton proposed that tubes from various parts of the ship should be made to open into, or rather beneath, the furnace of the great copper, in which the provisions of the crew were cooked; he thus supplied the fire with air from all parts of the ship, and kept up a constant current throughout all the compartments.

Concerning some interesting difficulties which beset Mr. Sutton in getting his plan tried in his majesty's ships; how he waited by appointment on Sir Jacob Ackworth, surveyor of naval works, at seven in the morning, and waited all day, to get at last a rude and unsatisfactory interview; how he was bandied about from one department to another; how, in a word, he got into the Circumlocution Office of those days, and got out of it again; concerning all these things, and a great many more, let the reader interested in Circumlocution history refer to the work of Dr. Mead.

The primitive ventilation contrivance which it was Mr. Sutton's ambition to annihilate in ships, and to supersede by his own, was, nay *is*, the famous "wind-sails plan". The wind-sails are made of sailcloth, and are usually between twenty-five and thirty feet long, according to the size of the ship. They take the form of a cone ending obtusely. When they are used, they are hoisted by ropes to about two-thirds

or more of their height, with their bases distended circularly by hoops, and their apex hanging downwards in the hatchways of the ship. Above each of these one of the common sails is so disposed, that the greatest part of the air rushing against it is directed into the wind-sail and conveyed, as through a funnel, into the lower part of the ship. This mode of ventilation is inefficient, cumbersome, and troublesome, but Mr. Sutton did not succeed in putting it down. It flourishes still, but in some ships metal funnels ending in tubes are now used instead of the wind-sail.

Since the time of Dr. Hales and Mr. Sutton, many other ventilation schemes have been proposed. We must, however, be content to refer only to such in the sequel as are of the most modern date.

The genius of these latter days has bewildered itself and others so extensively in devices of ventilation, that the saying of a wretched punster, "the whole question of ventilation requires to be thoroughly ventilated", conveys some touch of truth. To sum up in a few words what the genius of the age has done in this respect, however, would be but to say that it has inherited all the ideas of its grandfather, which ideas it has profoundly vocabularised, and reduced in some cases to the most difficult formulæ. The primitive ideas are not more than three in number. 1. To ventilate by heat. 2. By a pumping process. 3. By no process at all, except by the pressure and movements of the atmosphere, without let or hindrance; old nomade system modernised. Let us consider these plans in order, and refer first to Dr. Arnott's views of the uses of chimneys, and his own ventilating valve.

"What is incorrectly called the chimney-draught", says Dr. Arnott, "is a force exactly equal to the difference of weight between the dilated air in the flue and an equal column of the external atmosphere. This explanation shows why chimney-draught is directly proportioned, first to the dilatation, and therefore to the heat of the air in the flue, and then also to the length or height of the chimney, and it accounts for many of the common cases of smoky chimneys, and suggests appropriate remedies. An influence often overlooked, but of considerable importance, because it continues in operation during the summer, is produced by wind blowing directly across the end of an open tube, such as a chimney-pot. The stream of air, splitting on the chimney-pot, causes a degree of vacuum at the mouth, towards which the air from below moves."

"In sitting-rooms, bed-rooms, nurseries, and enclosed places generally, where people assemble, the impure air of the breath, the burned air from lights, the odour of dishes, etc., because heated and therefore specifically lighter than common air, all ascend first

towards the ceiling; but, as in ordinary rooms, no opening exists there for escape (for an open window-top in a room which has an open fireplace only admits the cold air), they soon contaminate the whole air of the room down to the level of the chimney mouth, through which only can any portion ultimately pass away.....

"The ventilating valve is placed in an opening made from the room into the chimney-flue, near the ceiling, by which all the noxious air above referred to is allowed at once, in obedience to the chimney draught, to pass away, but through which no air or smoke can return. The valve is a metallic flap to close the opening, balanced by a weight on an arm beyond the hinge. The weight may be screwed on its arm to such a distance from the axis, or centre of motion, that it shall exactly counterpoise the flap; but if a little further off it will just preponderate, and keep the flap, when not acted on by entering air, very softly in the closed position. Although, the valve, therefore, be heavy and durable, a breath of air suffices to remove it; which if from the room, opens it, and if from the chimney, closes it; and when no such force interferes, it shuts. The valve is so adjusted originally as to settle always in the closed position. An important part of the arrangement is the wire, which descends like a bell-wire from a valve to a screw or peg, fixed in the wall within the reach of a person's hand, by acting on which the valve may be either entirely closed, or left free to open in any desired degree. In cold weather, or with few persons in the room, the valve, when opened only a little, allows as much air to pass as is requisite. A flap of thirty-six square inches area is large enough where there is good chimney-draught for a full-sized sitting-room with company.

"It is to be observed that if the opening or throat of the chimney-flue over the fire be so wide that more air can easily enter there than can escape at the chimney-pot above, the chimney will not take air in also at the ventilating valve. It is essential, therefore, that with ordinary grates the register flap be so far closed, that when the fire is lighted, little more than the true smoke shall be allowed to enter; and not also, as is usual, much of the pure air of the room escaping with it to waste. A second great fault in common fire-places is the large space left between the fire and the chimney throat, in rising through which the true smoke contaminates much good air, which must then be allowed to pass away as smoky air."

Such is Dr. Arnott's valve; it has been extensively adopted, and when correctly fitted up, it acts well.

A second process for ventilation by means of the chimney has been patented under the title of the "Syphon Ventilator." We have described this plan in the JOURNAL OF PUBLIC HEATH for June 1855. Essentially it consists in bringing down a tube from the upper part of a room and making it enter the chimney at the lower part, or mouth.

This system has been also applied to lamp burners, a tube being carried from the burner into the chimney, so that a current of air is constantly being draughted from above the burner, through it, and so into the main shaft. Dr. Arnott hits mercilessly hard at this plan, stating that the descending tube weakens the force of the draught. There can be no doubt that the term "syphon ventilator", is unhappy and even incorrect. But for removing the air from gas burners the principle succeeds well, and a room may be temporarily ventilated pretty effectually on this plan, by simply carrying a pipe from the top of the room downwards to the chimney, and bending its lower end so as to make it turn into the chimney shaft.

A third patented process is that of Mr. Watson of Halifax. It consists in splitting the chimney into two parts by means of a diaphragm, or central partition. Under these conditions the smoke from the fire is presumed to ascend up by one of the divisions of the chimney, while a current of air descends downwards through the other division. The same plan has been suggested by Dr. Cowan (see JOURNAL OF PUBLIC HEALTH for December 1855), the idea being taken from the statement of Commander Priest, an officer of the royal navy, who found that by straining a piece of canvass vertically across the deck of a ship at the opening to the engine room, the temperature below was rapidly lowered. Mr. Watson's plan has been adopted in the General Post Office, London, and in many public buildings; but we are not able to record its success.

Various attempts have been made of late to effect a perfect system of warming and ventilating at the same time. In the prison of the Mazas, in Paris, this has been attempted by M. Grouvelle. "The air supplied to the cells in this prison is heated" (we take our description from the work of Drs. T. Richardson and Ronalds), "by contact with pipes containing hot water. Ventilation is produced by a vast chimney, about 40 square feet in section, and nearly 100 feet high, which is situated in the centre of the edifice. The whole of the air from the cells is drawn by the action of this chimney in a downward direction through a vertical pipe in each cell, which being in connexion with a night stool, serves, at the same time, for removing excrementitious matters. The pipes from the several cells terminate in an underground vault, whence the vitiated air is drawn off by the chimney draught. A balcony extends along each corridor, at the height of the

first and second stories, on to which the cell doors open. Channels are carried below these balconies, in which two sets of cast iron pipes convey currents of hot water in opposite directions. The channel is intersected by partitions, corresponding with the walls of each cell, and the air from the corridor is admitted to the spaces between these partitions by gratings, and thence, after coming into contact with a considerable surface of pipe, is admitted through several apertures to the interior of the cells." The chimney is said to be capable of drawing 1,059,300 cubic feet of air per hour, which, as there are 1,200 cells altogether, is equivalent to 882·7 cubic feet per cell per hour, or double the quantity required. By means of registers in the air vaults, the ventilation can be made uniform. Our authors commend this system, call it "very admirable", and "worthy of imitation by governmental boards in this country." We congratulate these gentlemen that they speak only of this ventilation from hypothesis; for if they had tried it practically for thirty-six days, as has one who is known to the writer, they would possibly substitute "execrable" for "admirable", and recommend our "governmental boards", in the name of humanity, to try no such experimental tricks on British soil.

Another plan of warming and ventilating is that of M. Duvoir. This has been carried out in the Hôpital de Lariboisière, and in many other public buildings in Paris. In this plan an open reservoir for hot water is placed in a large main shaft at the top of the building. The radiation of heat from this reservoir rarifies the air in the main shaft, into which transverse shafts open, which receive a series of ventilating tubes from all the wards of the building. The ventilating tubes run up the walls of the wards, and have two openings communicating with the wards, one at their upper, the other at their lower part. By closing the upper openings the room can be ventilated from beneath, and all impurities can thus be swept downwards; by closing the lower openings and opening the upper ones, the wards can be ventilated by a current upwards. The external air is freely let into the wards by numerous channels. Duvoir's plan is said to work well, and to be inexpensive.

The ventilation of the Newcastle Infirmary, executed by Mr. Dobson, is for many reasons the simplest and best of all the artificial systems with which we are acquainted. We must trespass again on the authors of the *Chemical Technology* for a description of this scheme.

"The wards are double. They are divided by a wall, in which

are the open fireplaces and ventilators. This wall is perforated with large circular openings to allow a free communication for the air from window to window, which can be regulated according to the direction of the wind. When open, the sash of the window is at an angle of inclination, causing the cold air to enter above the heads of the patients. Cold air is also admitted at the table foot at a sufficient distance from the beds to produce no inconvenience. The outside walls are built hollow, having an air vent, three inches wide, communicating with the atmosphere by air holes at the top and bottom. A current of air is thus established, which prevents the deposition of moisture on the walls. From this vent the cold air is conveyed by an air channel along the beams which carry the floor, and is admitted at the table leg, where there is a valve which can be closed at pleasure. The contaminated air is removed from the wards by exhaustion on a simple plan. The fireplaces in the parallel wards are placed back to back, having a malleable iron air chamber between them, protected from the action of the fire by fire clay lining. It is perforated at the top and bottom to allow the atmosphere, which is supplied to it from the room below, to become heated and pass off by the ventilating flue. Thus the heat of the fire in the ward above is made to ventilate the ward below." (p. 248.)

This plan is said to be at once simple and efficient. In the House of Commons, a plan of Dr. Reid's is adopted.

"The air is supplied from Old Palace-yard to the basement of the building; passing first through a filter, 42 feet long by 18 feet 6 inches deep, for the exclusion of visible soot, it arrives at the heating apparatus, consisting of large chambers intersected by steam pipes, and proceeds from thence to other chambers, where it can be mixed with cold air and brought to any required temperature. The floor of the house is double, and the space below the floor can be connected by means of valves with the hot air chamber. The floor is perforated by a great number of apertures, and these are covered with air cloth to diffuse the current. The air having performed its functions ascends to the ceiling, which is also double and perforated, whence it is carried off by the draught created by a powerful fire up a chimney shaft erected in another part of the building." (*Chemical Technology*, p. 251.)

The House of Lords is ventilated on a simpler plan; which is the less remarkable, because one more complicated could not possibly have been conceived.

"The floors of the rooms are simply heated by the passage of hot air beneath them. The hot air then escapes by passages along the external sides of the rooms to the ceiling, which is divided into two compartments, the one for the admission of the warm air entering at the sides, and the other for the exit of the vitiated air. The warm air, after passing below the floor to the roof, becomes somewhat cooled, so that its temperature on entering the ceiling is a few degrees lower than that actually present in the room; it conse-

quently descends to the level, at which it is at once heated again, and deteriorated by respiration, it rises through the centre of the room through the ceiling to a foul air chamber above, whence it is conducted to a chimney. In the chimney it is carried off by a motive power first suggested by Dr. T. Richardson. This power consists of a jet of steam, which when produced under pressure of 32 lbs. to the square inch, is capable of setting 217 times its bulk of air in motion: 10,000 cubic feet of air are thus gradually diffused per minute, no draught is perceptible, and no inconvenience from dust." (*Chem. Tech.*, p. 251.)

The exhaustion process through a shaft, by means of heat, has been applied in various other ways. In mines, a fire in the ventilating shaft acts exceedingly well. The upper manufactory rooms of Mr. Goode, of Birmingham, are ventilated, as was pointed out to us during a late visit to this establishment, by the simple plan of placing a refrigerator gas burner within a cone from a shaft ascending through the roof of the building. The air is admitted freely from without by the doors and other openings in the walls, and the draught through the shaft is most effective. This arrangement, adapted to use by Mr. Goode, junior, answers better than any previous one which he has tried.

The ventilation of gas burners is a subject that has received great attention. We have already said that the principle of the so-called "syphon ventilator" is good for this purpose, for we have seen it applied in this manner, and we find that it causes a brisk current of air to pass downwards through the burner into the chimney, and not only removes the products due to the combustion of the gas, but assists also to some extent in ventilating the room in which the burner is fixed.

A few years since, Mr. Faraday invented a ventilating gas burner. This consists of an Argand burner with a glass chimney, both of which are enclosed in an outer and larger glass cylinder, which is closed at the top by a plate of mica. The plate at bottom on which this outer cylinder and the lamp chimney rest, has an opening between the outer and inner glass cylinders, from which runs a pipe ending in a ventilating flue. The air to supply the flame is supplied by a separate pipe. When the lamp is in action, the air passing up the chimney lamp cannot escape at the top into the room, being prevented by the mica plate; it descends in the space between the two glass cylinders, and escapes by the ventilating flue. The great disadvantage of this plan is that the current of hot air passing between the two glass cylinders renders the glass opaque. Mr. Rutter has invented

a mode of meeting this objection, but as we are of opinion that a tube from the gas burner into a chimney on Dr. Chowne's suggestion is without any other addition sufficient for the end desired, it is not necessary to enter into further descriptions. In a room furnished with a well acting Arnott valve, the evils of the gas burner are also mainly removed.

The second method of ventilation is by a pumping or other mechanical exhausting process. We have referred to plans of this kind in speaking of Dr. Hales' invention. For modern improvements in this direction, the public are much indebted to Dr. Arnott, whose single ventilating pump admits of wide application. His gasometer ventilating process is also exceedingly ingenious, and is used in the York Hospital. It is, in a sentence, an air-pump. An air cylinder or gasometer moves up and down in a case more than twice as deep as itself, within which in its middle part is formed as a lining to it a thin circular trough of water, into which the open mouth of the cylinder plunges as it works. The case has at top and bottom certain valves on each side opening in opposite ways, and as the cylinder plays up and down in the case, pure air is alternately received into and driven out of the spaces below and above the cylinder, so that whether the cylinder be rising or falling, air is being pumped onwards into the ventilating channels of the house. In the York Hospital, the machine is worked by a small water engine; eight complete strokes of the pump are made per minute, giving a ventilation of 2,000 cubic feet in the same time.

A further plan of warming and ventilating at the same time is also the invention of Dr. Arnott, under the title of the "double current warming ventilation". In this process, by means of the ventilating pump, the heated impure air which accumulates at the top of a crowded room, is made in passing through tubes to transfer its heat to pure air passing through other tubes from another pump to feed the room.

Other schemes of ventilation by fans, ventilating pumps, steam jets, and the like, have, at various times, been employed. The principle is the same in all; Hales' bellows, improved upon or modified, and his Highness the Prince, to whom we have before introduced the reader, disgusted as usual, and in most cases obstinate. When Dr. McWilliam went on the Niger expedition, the steamers engaged in the expedition were ventilated by Dr. Reid on the "plenum and vacuum principles." A fanner, or ventilating machine, was put in motion either by the machinery of the steam engine, or

by the "krooman"; or when, in the river, the paddles being disconnected from the engine, by the paddles themselves, which acted as water wheels. From the ventilator a series of tubes proceeded to all the compartments of the vessel. When the fanner worked on the "*vacuum principle*", the vitiated air was drawn by it from the various compartments, and was discharged at an opening in the circumference of the fan box. When the "*plenum principle*" was resorted to, the fresh external air was connected with the centre, and blown into the distribution tubes to the several compartments. By this means it was hoped that, under any circumstances, fresh air might be infused into, or vitiated air extracted from the hold, or any part of the vessel. At some periods in this voyage the air was driven through a medicator, with the intention of removing carbonic acid, and evolving chlorine. How far this medication was useful, Dr. McWilliam does not "pretend to determine". The ventilation simply seems to have been tolerably successful.

We turn now to the third mode of ventilating, the true natural system, that, namely, of letting the atmosphere take its own course, giving it entrance everywhere, and escape everywhere. It may be that, under some circumstances, this system cannot be fully carried out, as in the well of a ship, and in underground rooms. In such cases the simplest of the artificial plans of ventilation may be useful; and Arnott's valve is generally advantageous in any room where there is a chimney, except in cases where a large ventilating shaft, distinct from the chimney, is also in action when the play of the valve is nullified.

But whenever it is possible to give the atmosphere free and natural vent, the best ventilation is at once procured, while the secret of the avoidance of draughts lies not in shutting out the atmosphere, but in letting it in freely. Men do not take colds when bathed in the atmosphere out of doors; nor would they in their houses if the atmospheric influence were as general within doors as it is without. But when one part of the body is exposed to a warm atmosphere, and another to a cooling draught fram some chink of a window, the circulation through the skin is of necessity rendered unequal, and a cold is the result. The absolute rule of ventilation ought to be, *to admit air into dwellings as freely as light;* a difficult thing to do, it is granted, but the end, after all, to be had in view. On this point Dr. Steele says: "Ventilation may be subdivided into two branches; the theoretical and the practical. It is useless to deny that the

majority of these attempts", the artificial or theoretical, "have signally failed", and he then quotes the words of the Newcastle Committee of Inquiry on Ventilation, which run thus: "With regard to ventilation, we have seen a great diversity of systems, and observed that the most complicated and expensive is that which has generally been found to be the least effective. In some we found furnaces and towers, built specially for this purpose, but now entirely thrown aside. In those whose ventilation was most perfect, we found the system most simple and natural."

The ventilation of rooms, whether wards of hospitals or in private houses, should be effected by free openings for both the entrance and the egress of the atmosphere. The doors and windows admit, when properly arranged, for the entrance, the chimney, when properly arranged, for the exit. The windows should extend from the floor to the ceiling of every room, they should open freely, and the plan of introducing some perforated glass panes, as proposed by Dr. Steele, should be universally adopted. Rooms also, whether wards or private rooms, should properly communicate by at least two of their sides with the air, and in isolated houses, by all sides, so that a free air current may pass through, and the force of the wind be brought into play, from whatever quarter it may blow.

As regards the chimney of a room, we believe that the old fashioned open chimney is the best for ventilation, and the open fireplace by far the healthiest for warming. This opinion about open chimneys, as we have seen, was held by Dr. Hales, and we beg the reader not to run away with any idea of discomfort in thinking of a revival of this old practice. Living once for some weeks in a room with a chimney open to the ceiling, we experienced no inconvenience whatever, but on the contrary, found all the pleasure arising from the inhalation of an atmosphere constantly removed from within, and renewed from without. Downward draughts and damps of smoke were unknown, and might be prevented in all cases by care in construction. Certainly the open chimney removes the possibility of the richly laden mantelpiece and the magnificent mirror. But what of that? who wants to admire his own shadow at the expense of breathing his own poison?

The hospital at Bordeaux, described by Mr. Roberton, is ventilated in the simplest way, viz., by having isolated wards, and these open to the air, from side to side, and from end to end, by means of long windows, so that a current is always

passing through "in correspondence with the natural laws of the atmosphere".

In carrying out this, the only natural plan of ventilation, the perforated zinc or glass plates are most useful. Through them the air passes finely distributed, to use a common term, and the danger of the "draught" is removed.

A few words yet have to be said regarding the amount of air that each individual requires. A very difficult question is here involved, since we do not always take in the same amount of air, nor always give up the same amount of carbonic acid. Some persons, it is true, have fixed arbitrary rules. It has been said that two hundred and twelve cubic feet of air per hour are required to remove all the exhalations of the body, and that a certain number of cubic feet in space are required to secure good health. But practical facts set the calculators' arguments aside, and show that everything depends on the mode of ventilation. Place a man in a coffin with plenty of holes in it, so that his Highness the Prince aforesaid can stroll through it at pleasure, and the man certainly won't die from want of air. Place the man in St. Paul's; seal him up there for good, so that his Highness the Prince can in no way and nowhere wedge himself in, and the man will die in time from actual want of air. A slave, in a slave-ship, has been made to exist in a space of fourteen cubic feet; in the London Hospital, some of the patients are allowed to luxuriate in a space of one thousand seven hundred cubic feet.

There is, in fact, no strict rule in reference to cubic space; the safest approximation to a rule is this; to give to each person as much space as possible, and to ventilate that space as freely as possible. In hospital wards, under any system of ventilation, one thousand cubic feet should possibly be the minimum allowance. In private houses, especially in the sleeping-rooms, not less than five hundred cubic feet should be secured.

It is not our intention here to dwell on the subject of the effects of impure air on health. The emanations from the bodies of men and animals are chiefly carbonic acid, ammonia, and water. The poisonous character of the first of these when inhaled is well known. Dr. Bence Jones assumes, from the experiments of Le Blanc, that air containing one per cent. of carbonic acid indicates so impure a state of the atmosphere, that if breathed for twelve hours it would prove injurious. In large doses, the acid kills at once, by arresting the respiration and the oxidation process. What the

mischiefs are which arise from the inhalation of small quantities of ammonia we have yet to learn.

In conclusion, we have the honour of being entrusted with an important message. His " veritable Highness the Prince of the Power of the Air" commands us to convey to all whom they may concern, These,—1. That his Highness knows what he is about. 2. That, as his duties are onerous and special, he dislikes interference. 3. That all meddlers who try to cripple him in his plans, and to make him act in accordance with their limited knowledge, will find themselves checkmated. 4. That he is taken with Dr. Arnott, and has no objection to the ventilating valve, *pro tem.*, but would urge that gentleman to invent for his countrymen a new kind of house, through which he, the Prince, could walk with fewer obstructions. 5. Lastly, that it is his Highness's pleasing duty to do all in his power—which, without boast, is great—for the good of mankind ; that from the performance of this duty he never rests, but that he is continually prevented from accomplishing his most useful intents by the ignorance, the selfishness, and the meddlesomeness of those who depend on him for life itself.

OZONE.*

Since the time when Schönbein first pointed out the existence in the atmosphere of a peculiar principle, to which he gave the name of ozone, and which he supposed to be identical with the peculiarly smelling product developed in the electric discharge, great attention has been paid to the matter, both in this country and on the continent of Europe.

We have now before us, in a volume published within the last few days, the largest and latest work on this interesting subject. M. Scoutetten has, indeed, undertaken here to represent all that has been said regarding ozone, its nature, its development, and its influence. That our author has failed in writing a fair and extended review, is a fact that must be acknowledged, when it is stated that he has not referred to one English authority. Glaisher, Moffat, Barker, and many others, including even Professor Faraday, have, with their

---

* L'Ozone, ou Recherches Chimiques, Météorologiques, Physiologiques et Médicales, sur l'Oxygène Électrisé. Par H. Scoutetten. Paris : Libraire de Victor Masson. 1856.

On the Relative Value of the Ozonometers of Drs. Schönbein and Moffat. By T. Herbert Barker, M.D. London : 1856.

works, been entirely ignored or overlooked by M. Scoutetten. The views propounded in this new treatise run briefly as follows.

Ozone is oxygen positively electrified; it is produced naturally in the atmosphere everywhere; it is formed during the natural electrical discharges, and during certain chemical processes; it is the most powerful oxidising agent known; its presence is more strongly marked in the night than in the day; and it is irregular in its progress. From observations carried on at Metz, during six months, M. Scoutetten found that in a close, narrow street, with a cesspool at its head, the presence of ozone was only seen to be developed four times, though looked for daily, night and morning. During the same period, observations were taken at a window of his own apartment, looking southward, and above a garden; as well, also, at the military hospital, an isolated building. In both these places the indications of ozone were always given, being sometimes very strongly marked. He infers, therefore, that the ammoniacal and other emanations of close localities check greatly the production of ozone; and, although experiment proves that ozone is more freely indicated at great heights, as on a mountain, yet in reality it does not progressively increase in quantity according to elevation, but diminishes in the lower atmospheric strata from local influences.

A curious fact in the development of ozone is, that it is produced with peculiar freedom over a surface of earth covered with vegetation, and over water. A series of experiments are recorded, also, to show that there is no development of ozone in an inhabited room. It would seem, indeed, that the presence of one individual is sufficient to prevent the detection of ozone; for Scoutetten found that in his own bedroom, which was perfectly lightsome, and well ventilated, the ozone paper remained perfectly white, although, when exposed to the free air on the outside of one of the windows, it was always more or less tinted. In the hospital of Versailles, Dr. Berigny found the same result. The non-colouration of the ozone test-paper in the inhabited room is, as we opine, due possibly to the presence of ammonia, which, according to our researches, is always being evolved from the animal body.

Some remarks and experiments on the physiological effects of ozone tend to show, that in a large dose ozone rapidly produces excitement of the respiration, spasms of the bronchial tubes or vessels of the thorax, and, more slowly, upon its action being prolonged, coryza, intense bronchitis and pneumonia. In proper proportions in the air it is, how-

ever, indispensable to the due accomplishment of the living functions. In confined places, where its presence is not, plants and men alike become blanched; the skin in the man becomes pallid, the blood loses colour, the lymph predominates, all the tissues soften, and serious diseases (of the adynamic type) break out.

The last sections of the book are devoted to an inquiry into the connexion supposed to exist between the presence or absence of ozone, and the existence or prevalence of certain diseases. The opinions here recorded from various observers are contradictory. M. Schifferdecker is quoted as expressing the view that there is no connexion between the presence of ozone and diseases of the chest. His view is opposed by Scoutetten, who traces in the records of the military hospitals of Metz an exact correspondence between the variations of ozone and the number of bronchial affections. It was not, however, on the same days when the ozone papers were tinted deeply that the patients entered the hospital, but only on the following day, or many days afterwards. This occurrence is explained away by the hypothesis of a period of incubation; rather a shaky argument.

Some further observations supporting the hypothesis of a connexion between ozone and some chest affections are supplied from the labours of M. Böckel, but these seem to us to be built on insufficient data.

The work of M. Scoutetten concludes with a short chapter on the employment of ozone in therapeutics. The book is well worthy the attention of all our readers, and we regret much that, from the fact of its very recent publication, we are not able to give a more complete analysis of its contents.

Dr. Barker's *brochure* is written simply to show the superiority of Dr. Moffat's ozone papers over those of Professor Schönbein, a superiority which seems to be established beyond all doubt. The comparison of the two papers was carefully made, and extended over a period of eighteen months, daily. During this period there were 122 days on which Schönbein's ozonometer indicated the presence of ozone, while Moffat's gave the indication on 207 days, and never failed to receive a tinge whenever Schönbein's gave the indication. The total amount of ozone indicated by Schönbein's paper, during the entire period of observation, is represented by the number 353, while Moffat's paper registered 793. The mean monthly amount by Schönbein's ozonometer was 19·50; by Moffat's, 44·05. The mean daily amount by Schönbein's was 1·70; by Moffat's, 3·83.

THE EPITOME OF SANITARY LITERATURE.

SMOKE NUISANCE.*

MR. WILLIAMS'S PRIZE ESSAY, on *The Prevention of the Smoke Nuisance*, will repay perusal. He argues that the "combustion of smoke", according to the common acceptation of the term, is impossible. He traces the carbon rising from a fire through four stages: 1. As carburetted hydrogen gas; 2. As raised by heat to the temperature of incandescence; 3. As confirmed with oxygen as invisible carbonic acid; 4. As lamp black or soot, having escaped combustion by not having had access to air before it was cooled below the temperature required for chemical action. The remedy for smoke, therefore, is, to provide for the admission of air to the furnace at the proper time and in proper quantity, so as to insure the combustion of the carburetted hydrogen gas, at the time when, from its high temperature of incandescence, it is best fitted to receive it.

PREVENTIVE MEDICINE.†

THE THURSTON SPEECH of Dr. Barclay, on "The Progress of Preventive Medicine," is written in a good spirit; and if it puts forward nothing new, it contains many facts and arguments which cannot be too often repeated and impressed on the minds of earnest men.

One passage will illustrate the tone of this address:

"All advances in the practice of medicine have proceeded on a further knowledge of the causes of disease, and the exact influence of external agents upon morbid and healthy structure. That practice is utterly worthless, which in the present day goes back to the darkness of the past, and deals only with symptoms. The man who attempts to aid the operations of nature without knowing what those operations are, can only owe his success to the *vis medicatrix naturæ*. . . And it is worthy of notice, that the very persons who owe most to this kindly interference, are generally the loudest in boasting of the cures they have wrought. Medical philosophers of the present day have ceased to talk of *curing* disease."

LUNACY LAWS AND ASYLUMS.‡

DR. WEBSTER, in contrasting the Lunacy Laws and the Asylums of England and France, argues that the British

* Prize Essay on the Prevention of the Smoke Nuisance. By C. W. WILLIAMS, C.E. London; John Weale. 1856.

† The Progress of Preventive Medicine and Sanitary Measures; being the Thurston Speech on the Mendy Commemoration at Caius College. By A. W. BARCLAY, M.D. Cambridge: Deighton, Bell, and Co. London: Bell and Daldy. 1856.

‡ Remarks on the Lunacy Laws, and the Asylums of England and France. By JOHN WEBSTER, M.D., F.R.S. London: 1856. Reprint from the *Psychological Journal.*

legislature might take useful lessons from their neighbours, specially with regard to the forms required for conveying lunatics rapidly to the protection of an asylum. The law of Interdiction in Scotland for those who, from "weakness, facility, or profusion," are liable to imposition, is dwelt on also by Dr. Webster, as well worthy the attention of Parliament in reference to its application to England.

ANIMAL DIET.*

Mr. Bernard Moncriff's *Philosophy of the Stomach* is written to show that men could and should live exclusively on an animal diet. The author himself has thus subsisted for eighteen months. Fair readers of the *Journal of Public Health*, here is a good time come for one of you; for thus writes Mr. Moncriff. "I am yet unmarried, and entertain the natural wish to meet with a well educated lady, worthy of my sympathies, and reciprocating them, who should feel inclined"—ah! here's the rub—"to embrace my dietetical principles, or at least be so much in their favour as to allow"—Mr. Moncriff is evidently reckoning without his host at this point—"our children to be brought up in the same principles." Poor Mr. Moncriff! Ladies fair, grant him your smiles, as an overpowering recompense for the stern truth we are going to tell; viz., that this self-written hero has diluted a dozen lines of fact matter in ninety-two pages of egotistical nonsense and half-learned science.

TURNBULL ON DISEASES OF THE STOMACH.†

Dr. Turnbull's Treatise is a useful work. The chapters on the Chemistry of Fermentation, on Fermentive Disorder, and on Diet, are clearly and carefully written. The author propounds no particular theory or new fact, but attempts a comprehensive review of his subject, in which task he succeeds well.

Reports on the Sanitary Condition of Swansea, by Mr. Michael; of Dudley, by Mr. Houghton; of Shoreditch, by Dr. Barnes; of Hackney, by Dr. Tripe; and of Lambeth, by Dr. Odling, are all valuable documents. They deserve and will receive special attention.

---

* The Philosophy of the Stomach; or an Exclusively Animal Diet is the Most Wholesome and Fit for Man. By Bernard Moncriff. London: Longmans. 1856.

† A Practical Treatise on Disorders of the Stomach with Fermentation. By James Turnbull, M.D. London: Churchill. 1856.

ORIGINAL COMMUNICATIONS.

THE PATRIARCHS OF PINNER, MIDDLESEX.

By JOHN WEBSTER, M.D., F.R.C.P., F.R.S.

In previous numbers of the Journal of Public Health I briefly communicated some curious grave-stone statistics, personally collected from different cemeteries in the vicinity of London, in East Anglia, and throughout several central counties of Scotland, my chief object in instituting these researches being to ascertain the real or the comparative salubrity of particular districts. However, when commenting upon the facts so obtained, I stated that the inferences drawn should not be received as *absolutely* correct, but as approximations only to a general truth. As further illustrating the question there discussed, I now refer to a locality I have recently visited, where very old age seems exceedingly common amongst the inhabitants. The place here alluded to is Pinner, situate about thirteen miles north-west of London, and nearly three beyond Harrow-on-the-Hill. This part of Middlesex occupies high lying ground, adjoining a feeder of the river Colne, and constitutes almost entirely a grass-growing or grazing district. Its surface being undulating, and ornamented by villas and many fine trees, with truly luxuriant plantations, the environs of Pinner are very beautiful. The township itself, or village, is small, looks rural and primitive, but pretty; whilst most of the houses or humble tenements appear to have undergone few changes since they were originally constructed. As evidence of this, the principal inn, where weary travellers can refresh themselves, may be confidently pointed out, as it exhibits the same outward aspect as it did in 1711, when first built; that date being visible on the exterior of this very unpalatial looking hostelry, which consists chiefly of lath and plaster, with an overlapping upper story, like many antiquated metropolitan dwellings erected at a parallel period. The ancient parish church, founded in 1322, should be also named, since it has continuously served for celebrating divine worship during upwards of five centuries.

Within the gently sloping, yet somewhat picturesque, burying-ground,—although by no means of large extent, or marked by numerous monuments,—the very great ages inscribed on many of such of its death memorials as still exist, are unmistakeably eloquent of longevity, when compared with

similar records noticed elsewhere. Thus few graves formed the resting places of very young persons. Several were of persons between 65 and 80 years; whilst, from that advanced period of life to beyond 100, not less than thirty-six instances were noted, comprising eighteen of each sex, which may be thus classified. Of men, three died at 80; three at 82; one at 84; one at 85; one at 86; three at 87; two at 88; one at 90; one at 92; one at 94; and one man had actually attained 118 years! Amongst the women, three died at 80; one at 81; four at 84; two at 85; two at 86; two at 89; one at 92; one at 94; one at 100; and another was a centenarian, being 102 years old at her death. Respecting this last-named woman—Betty Evans—it should be mentioned, that she had a sister, buried at Watford, who lived to 104; that she was born at Ruislip (an adjacent hamlet, whose cemetery also contains centenarians), died in 1853, and was buried only a few years after her elder relative. The male patriarch reported to have seen *a hundred and eighteen* winters, was named William Skenelsby, and departed life on the 7th of November, 1775; but regarding his birth-place no information can be derived from his modest grave memorial. To indicate still more conclusively the unusual longevity frequently characterising modern dwellers in this neighbourhood, it becomes important to add that the present clergyman has performed funeral services over the graves of two of his centenarian parishioners. Besides this peculiarity, from the 1st of January, 1856, to August 24th, when I perambulated Pinner churchyard, to verify the mortuary details just chronicled, the same gentleman informed me that five persons, who at death were 82 years and upwards, had been buried therein by him, of whom three were men, aged 82, 86, and 94 respectively, with two women, one being 88, and the other 85; the funeral of the last took place in the afternoon of my visit.

Taking all the facts above enumerated into consideration, it may be fairly inferred that Pinner is a healthy residence, and occupies an elevated position in the scale of longevity, speaking comparatively. No district alluded to in my former reports, published in the JOURNAL OF PUBLIC HEALTH, supplies so large a proportion of very old people as this, which hence becomes an instructive and singular example of many long-lived persons belonging to one locality. It is only necessary to add, that the annual burials in this country cemetery range from eighteen to twenty, amongst a population of not more than 1310, according to the census last published.

24, Brook Street, Grosvenor Square, September 1856.

ON THE TERRITORIAL DISTRIBUTION OF THE POPULATION, FOR PURPOSES OF SANITARY INQUIRY AND SOCIAL ECONOMY.

By HENRY WYLDBORE RUMSEY, Esq.

[*Read before the British Association for the Advancement of Science. Cheltenham, Aug.* 12, 1856. *Section F.*]

In the present condition of society, but few and rare opportunities are afforded to States to group their populations on scientific principles, to determine the most salutary and beneficial sites for human habitation, or to combine the sites so occupied in well-contrived districts for the purposes of statistical inquiry and local management. No reasonable excuse can be made for omitting to provide for a judicious allocation and distribution of a *new* population, as in the case of military colonies, and of settlements on unoccupied tracts of land. To neglect this public duty must be to inflict irreparable injury not only upon the first occupants, but even more seriously upon their descendants; as has been unhappily proved by numerous instances of unskilful migration and colonisation in the history of our own race.

Enough is already known of the influence of climate and soil, and other natural features of locality, upon man's physical and psychical condition to prevent any gross mistakes being made in future, either by governments or by the promoters of voluntary and associated enterprise.

We are now in a position to show that no occupation of places, notoriously and obviously unhealthy, for mere commercial purposes, is justifiable, or likely to be ultimately beneficial to a community. How great the peril and loss which have resulted from peopling such spots as the deltas and *embouchures* of large rivers; the banks of sluggish streams; alluvial soil periodically deposited by floods upon lands where drainage is most difficult, if not impossible; closely pent-up valleys among mountain ranges and in clefts of table land, tempting the ignorant and unsuspicious by their beauty and verdure and apparent security! Surely, the consequent destruction of life (in some cases enormous); the deterioration and degradation of the inhabitants, not only in their physical structure, but in *their mental and moral excellence;* and the immense sacrifice of national and personal wealth which is afterwards demanded to palliate the frightful evils which man has thus inflicted upon himself; are considerations of sufficient importance to decide the national course for the future with regard to colonisation or migration.

2. But, in England, we have to deal with an *old* population, rapidly advancing in civilisation, having its established laws, its recognised divisions, its carefully protected rights of property (both corporate and private), and, moreover, extremely jealous of changes, even when proved to be conducive to the public welfare. Hence the difficulties which attend any re-opening of the question.

But these difficulties are not greater than many which the persevering Anglo-Saxon race, with its Scandinavian and Norman elements of force and energy, has often overcome.

I would rapidly glance at some of the causes of population movement which have occurred since the settlement of our island by its present composite race. In the middle ages, locomotion was common enough. If later facilities of transit were wanting, later obstacles to it had not then arisen. A hardy and daring people, of simple habits and few possessions, living in a country only partially enclosed, had little to check their migratory tendencies, except the will of chiefs and conquerors, where that could be enforced. Clans, serfs and villans were bound far more to their lords than to the land, and moved at command. Continuous practice in civil and foreign war enabled armed bodies to shift rapidly and easily from place to place, while settlements for industrial purposes were as repeatedly changed, to escape feudal oppression, military exaction, or religious persecution. Even the lonely and helpless travelled in those times more securely, if not comfortably, than some are disposed to think. The age had its decencies, as well as its asperities, and special means of protection existed. Inns, or rather hospitals (*hospitia*, whence our old "hospitality") abounded, and ecclesiastical refuges were thickly scattered throughout the land.

But after the fifteenth century, the gradual consolidation of the parochial system of England checked irregular migration and regular vagrancy; and it is needless to describe, for we all know, the effect of that system in *fixing* each man, woman, and child to a certain spot. The great social reform effected in the reign of Elizabeth led to the settlement laws, and the people became, in a peculiar sense, *adscripti glebæ*. Hence, as roads did not improve, and as property with its attendant comforts and conveniences increased, the parishioner became less inclined to move and more apprehensive of the perils of travel, while the man of substance made his will before a journey of fifty miles.

Now, however, the social immobility of the seventeenth and eighteenth centuries has again relaxed, and is fast pass-

ing away. The settlement laws have been greatly modified. We are again becoming, in some sort, a nomadic population. Business, speculation, science, health, pleasure, and the mere love of change (a kind of vagrancy) shift us from place to place, unsettle our local associations, and loosen our local bonds. The very character of our habitations is changing; the massive stones and timbers which formed the wall of one house, three or four centuries ago, would now suffice, under structural improvements and economy of material, for half-a-dozen houses. Iron and wooden buildings, of all sorts, sizes and shapes, fitted for all purposes, domestic and public, are now made and sold in great numbers, ready to be packed and transported, commodiously and cheaply, to any distance, by railway or ship. No Mongolian wanderers of Central Asia ever struck, carried and pitched their rude tents with such facility as we now do our skilfully constructed portable houses. The legal transfer of property is also becoming far less costly, and therefore more common. Another barrier to change of residence is thus removed.

3. But the most important movement of the population in modern times has reference to its local aggregations. To go back no further than the beginning of the present century; the inhabitants of cities and towns in England did not then number one-third of the total population; but during the half century ending in 1851, they had increased so rapidly as to equal the population of the rural districts.

In connexion with this greater compression and condensation of the population in certain localities, many and serious evils—physical, social and moral evils—which I need not here specify, have accrued; but the results are beginning to be so much more clearly felt and understood by the people themselves, that a movement of a corrective and compensating kind has lately arisen, and is now, I believe, proceeding at a considerable pace. The crammed interiors of towns are gradually disgorging the human masses which they have swallowed (it may be said) too quickly for a safe social assimilation. New openings and lines of street, through the centres of closely built cities, are dispersing their banefully crowded inhabitants. Narrow lanes of tall houses, confined courts and alleys, dark basements and cellar dwellings, reeking with all physical and moral impurity, are now being emptied of their injured occupants; even dwelling-houses of a better sort in the heart of old towns are being fast converted into warehouses and workshops, so that a steadily diminishing proportion of the people sleeps within ancient municipal limits.

The working classes, thus displaced, are finding accommodation in the outskirts, and spreading over the surrounding districts. Thus, the benefits of an almost rural residence are no longer exclusively enjoyed by the man of office, the banker, the lawyer, and the merchant; for the small tradesman and the clerk have followed the wholesome example, and the centrifugal impulse now extends even to the artizan and the porter.

Suburban areas are accordingly increasing much faster than urban populations, while the universal railway enables a far larger proportion of the working classes to live conveniently and economically, beyond the reach of town smoke, to see the sun rise, and to breathe the fresh air of green fields.

4. This movement, be it observed, is advancing in the teeth of laws and institutions, which are now worse than useless. No one would pretend that the original object of municipal organisation any longer influences our population. We need no protection against monarchical or feudal tyranny. Yet the tendency of all past legislation, even to this day, has been to impose narrow territorial limits upon town communities, and to tempt the people into injurious aggregation.* To abolish our absurd and mischievous isolations of political rights, and to extend municipal privileges to the entire population of the kingdom, would materially aid in restoring that salutary balance of town and country population which has been temporarily disturbed by the rapid advance of commerce and manufacture, unaccompanied by provisions for a beneficial allocation of the people.

But whatever may be done or left undone as to parliamentary representation, it is clear that the gradual outpour-

---

* Certain political privileges, to say nothing of the substantial advantages which it is found so difficult to separate from the parliamentary suffrage, have been exclusively bestowed upon the freemen and burgesses of *boraughs;* and the working man, in too many instances, has not feared to encounter the higher rent of a house within the limits consecrated by parliament, because he knows that, when his vote is wanted, his landlord will be paid. A wise reversal of such mischievous legislation might promote that most desirable and sanitary reflux of the population, to which I have already adverted. If owners of real property (freeholders) ought still to be represented by "knights of shires", why should not tenants in rural districts share that representation which is now possessed exclusively by tenants in boroughs? Is not the ten-pound house in the country (I do not say, its occupant) superior in every respect to the ten-pound house in the city? If a householding qualification for voters be still considered essential to the safety of the "British constitution" (?), why not confer upon every such householder, throughout the land, the right of voting in that borough with which he might be most conveniently connected? Why not thus enlarge the areas of parliamentary boroughs until their limits meet, and finally settle the question of future extension?

ing of town populations will remove many current objections to an amended division of the country for statistical and sanitary purposes; and we shall, therefore, do well to look closely and carefully into the anomalies and perplexities which attend upon the various systems of territorial distribution.

5. Our old parochial divisions are not uncommonly found to be wholly irreconcileable with the altered grouping of the people. If the venerable parish church, with its sacred and ancestral associations, still attracts, and, to a certain extent, localises the population in many rural districts,—the colossal mill, the palace of manufacture, the coal field, the mine, and the harbour, determine more rapidly and imperatively the aggregations of a commercial and industrial community,—and, I must add, too often with utter and appalling neglect of the physical and moral prospects of the population thus brought together.

These new hamlets and townships are almost necessarily formed without reference to parochial boundaries, which, if not revised and corrected to meet the changes of population, become practical nuisances. Hence, in populous districts, legal powers are occasionally conferred upon municipal or ecclesiastical authorities to alter and amend parochial limits. As new sites are peopled, new divisions and boundaries must be settled. But, I would ask, are these alterations made upon any definite and well considered principles? Does science aid them? does enlightened experience direct them?

Beside the parochial divisions of the country, there are others as ancient, yet still more in conflict with the changing localisation of the people. Tithings and hundreds have generally become little more than matters of history. Boroughs and cities very rarely include an exact number of parishes, or coincide precisely with parochial limits; parts of the same parish are commonly to be found on either side of the same municipal boundary, and even in different counties.*

6. But the comparatively recent division of the country into *Poor-Law Unions* was based more accurately upon the parochial system, and unions are generally exact aggregates of a number of parishes. The same union, however, often includes parishes or parts of parishes in two or three counties; and, generally speaking, no kind of relation exists

* The late Mr. Rickman noticed, that "there are in England and Wales about 550 parishes which are known to extend into two counties, or into more than one hundred, or other division." (Census of Great Britain, 1851, 8vo, p. 24.)

between the boundaries of boroughs and those of parochial unions. The latter were also formed without any regard to the natural features of the district. Great facts of physical geography were wholly ignored. The able and learned gentlemen who were officially employed to describe, define and form the unions, did not profess to be guided by scientific considerations, or to be influenced by established principles of hygiène. Science, commonly so called, had, therefore, no effect upon their decisions. It would even appear that facility of communication between different parts of the same union or district must have been purposely set aside in many instances. It was probably, in such cases, rather an object to place some highly pauperised group of population at a distance from the sources of relief on which it had learnt so injuriously to rely. The hilly ridge, the pathless morass, the bridgeless river, were therefore seldom considered as necessarily marking the limits to a union or district.

Without enumerating other divisions, ancient and modern, some for the administration of justice, others for taxation, others for ecclesiastical polity, I have already noticed enough of conflict and diversity among all these systems of partition to convince any one of the great difficulties under which both official recorders and students of vital statistics must labour.*

7. The registration system of this country, with which is now combined the machinery for the census, is based upon the Poor-Law division into unions. The registration districts are, therefore, 620, and the subdistricts 2,190 in number, each subdistrict containing, on the average, seven parishes, townships, or places, and some populous parishes being divided for the purpose. Thus, the returns of population, births, deaths, and marriages, in "union" districts, have made the defects of the Poor-Law division more obvious; while an erroneous distribution of the people has, in turn, affected the compilation of vital and sanitary statistics. Moreover, no information upon such matters is offi-

* "The inconveniences and perplexities which the variety of ecclesiastical, military and civil, fiscal and judicial, ancient and modern, municipal and parliamentary, subdivisions of the country occasion, have been sensibly felt by us, as they were brought under our notice in the enumeration of the population. It is not within our province to reduce all these to simplicity and harmony; but we call attention to their existence, and venture humbly to suggest that the task of taking any future census, the comparison of statistical facts of every kind, and probably all administrative arrangements, would be greatly facilitated by the adoption of an uniform system of territorial divisions in Great Britain." (Census of Great Britain in 1851, 8vo, p. 25.)

cially published in each locality.* So that it has been found extremely difficult to ascertain the bearing of any natural or artificial features of a particular tract of country, or any social characteristics of a populous district, upon the life, health, and welfare of its inhabitants.

To give an instance; the other day, I was questioned by one of the Vice-Presidents of this section concerning the physical and sanitary condition of the population of the Forest of Dean, in this county; a district of peculiar geological formation, bounded by important rivers, and inhabited by a very distinct class (I had almost said race) of people. But the fact came out, that the registration and census divisions give no collective information on the subject; for not only do those unions, which contain most of the Forest parishes, embrace other portions of population in widely different circumstances, but no fewer than twelve of the Forest parishes, containing a total population of more than 20,000, are contained in unions nominally belonging to the adjacent counties—Herefordshire and Monmouthshire. Nor does it appear that those Forest parishes, which are included in the adjacent "registration" counties, constitute separate districts, so as to admit of being again grouped with the Forest subdivisions, for statistical returns. To determine correctly the physical and social condition of this remarkable population would, therefore, require a completely new arrangement of the parochial groups, and a new compilation of ultimate facts.

I might give other instances within my own limited sphere of observation, especially in unions containing both town and country populations—the several districts of which have not been determined with reference either to the condition of the inhabitants, or the natural features of the inhabited surface—and from which, therefore, *no trustworthy statistical deductions can be drawn.* For this, among other valid reasons, it is unsafe to adopt the rate of mortality in any union (registration district) as a test of the actual salubrity either of its principal town or of its more scattered population. The apparent rate of mortality in large towns is swelled by deaths in hospitals and workhouses of people who lived in distant country parishes. Either the mortality of all such institutions should be returned separately from that of the districts in which they are contained, or the deaths should be carried to the account of the several parishes from whence

* Except in places where officers of health have been appointed, and there only partially.

the patients come. Periodical returns of the vital force of the population (*i.e.*, the ages of the living) are also essential to correct such conclusions as are drawn solely from the number of deaths. I must, therefore, repeat, that until our vital statistics are more complete, and are compiled from a more scientific classification of the people, we can arrive at no satisfactory conclusions respecting the life, the health, the social state, the education, the morals, and the habits of those who inhabit the several places; we are unable to demonstrate the causes of social evils; and, therefore, we cannot call upon the legislature to inaugurate those reforms which, in this country, can be carried into effect only by the cordial co-operation of the enlightened and influential portion of the community.

9. Another obstacle to a scientific division of the country arises from the coexistence of several sorts of local *administrative bodies*, exercising conflicting functions, and with different areas of jurisdiction.

On the one hand, we have boards of guardians, elected by ratepayers and owners of property, and aided by the magistrates of the county, as *ex officio* guardians. These boards, as was well shown before the Committee on Sir B. Hall's Bills in 1855, superintend the interests of the entire population, and have already so many sanitary functions to perform, that they cannot and (we may rely upon it) will not be set aside by any general measure of public health which would leave them out of the question. It was, therefore, in my opinion, a mistake in the last Act for the Removal of Nuisances, etc., to confer upon boards of guardians the "wooden spoon" distinction among the corporate bodies, a list of which is given in that Act, in the order of their assumed fitness for local sanitary administration.

On the other hand, we have, in most towns, either local boards of health, or bodies of town commissioners, or town councils, elected in various methods, some tolerably good, others open to objection, but none, as far as I know, superior to that adopted for the election of boards of guardians. And to these bodies another class of sanitary functions is committed, though not exceeding in importance those exercised by boards of guardians. There are, therefore, two kinds of functions, imperfectly defined, and exercised in most places by at least *two* elective bodies, with different areas of jurisdiction—the sanitary and vital statistics being collected by that body, which has been the most distrusted as regards the sanitary management of the district.

10. Before proceeding to practical suggestions, I would briefly call attention to some of the anomalies and inconveniences which have resulted from limiting the execution of sanitary powers to bodies representing only dense and circumscribed portions of the population.

Among the practical evils of limited jurisdiction, I may notice, (1) the difficulty of obtaining an adequate and unexceptionable water supply; (2) the difficulty of providing outlets for common sewers, and markets for the products of sewerage: (3) the difficulty of protecting streams and rivers from defilement and impediment; (4) the difficulty of securing suburban places of sufficient extent for public recreation, for the erection of sanative institutions, and for the burial of the dead.

Again, the population surrounding these confined jurisdictions is excluded from even that small amount of benefit which may be derived from existing local sanitary administration. In a report on the mortality of Gloucester, which I presented to the Registrar-General in 1848, I showed, by a comparison of the deaths, the ages at death, and the apparent causes of disease, in the city proper and in the suburbs, that the latter were by far the more unhealthy and the more urgently in need of vigorous measures of sanitary reform. Mr. Cresy, the superintending inspector sent by the General Board of Health, confirmed the correctness of my distinction, and accordingly recommended that a considerable district of country, extending in some directions two miles from the centre of the city, should be included within the jurisdiction of the local board. But political questions arose; the town council claimed exclusive powers, and the provisional order was ultimately applied only to the parliamentary borough. The result was thus described, four years afterwards, by a resident gentleman of great intelligence, and belonging to no profession:—

"The jurisdiction of the Local Board, I am sorry to say, does not extend beyond the boundaries fixed by the Municipal Act, which practically excludes one-third [more now] of the population from any control. Upon this serious obstruction to sanitary improvement, my attention has long been fixed. I counted seven hundred houses on one side of the city, whose only drainage is Sudbrook, all beyond control; and, owing to the direction of the prevailing winds, the town has the full benefit of all the effluvia which their refuse creates."

The suburban residents looked in vain to the managing

authority of the outlying districts for redress; for, said he, "The board of guardians does not co-operate with either the Local or General Board, but, I believe, offers all the obstruction in its power."*

Now this I believe to be a very common case.

11. The suburban population of towns, for reasons already stated, consists more and more of persons belonging to the humbler classes of society; and unless efficient building laws, founded on established sanitary principles, be enacted and enforced to protect the working classes against the injurious speculations of unscrupulous capitalists; unless, moreover, a sounder system of education than the present be extended to the whole working population—I mean a moral, industrial and physiological education, which may enable men and women to comprehend their true relations to the external world, and their duties to society and to their families;—unless they are thus trained in thrifty habits, and induced to devote some portion of their wages (now often worse than wasted at the beer house, the gin shop, and the casino) to the payment of a somewhat higher rent for well located, well drained and well ventilated dwellings; unless, I say, these social changes be effected, *we must expect to see an aggravation of sanitary and social evils among the suburban and rural, as well as among the town, populations.*

12. Again, "the error of commencing sanitary legislation, by circumscribing sanitary jurisdictions, has led to the adoption of a canon of administration, wholly unreasonable and undefensible, namely, that all districts in which it cannot be proved that an excessive number of persons die annually shall be exempted from the operation of sanitary law.

"Observe the difficulties into which the movement party has brought itself by this concession. The first question of the objectors is—What do you mean by excess of mortality? All above *twenty-three* in a thousand of the population—the average of English mortality, according to the Public Health Act. All above *seventeen* in the thousand—the "natural rate" of mortality—pleaded our first vital statist. All above *twenty-seven* in a thousand replied the ingenious and indefatigable advocate of the parish-vestry party. All above *twenty-five* in a thousand, concluded Parliament, because that number split the difference between Sir Benjamin Hall and Mr. Toulmin Smith.

"The excess of mortality being thus summarily, if not satis-

* Essays on State Medicine, pp. 333-4.

factorily, settled,—the fatal effects of the want of a preventive law having been correctly calculated—the required number of lives having been prematurely sacrificed to the regulated neglect—the preventive law may then, and not till then, be enforced. One is irresistibly reminded of the stolen steed and the order to fasten the stable door. All this, be it observed, is based on the assumption that a certain annual ratio of deaths, in any spot, is *the* test of its insalubrity. To argue further on such a point would seem to be a mere waste of time. Yet I must be allowed, by way of illustration, to to ask—What would have been thought of a proposition to restrict the application of the new Poor-Law to parishes in which the rates exceeded so many shillings in the pound? Or, of a Bill to abolish the constabulary force in every county or district in which less than an average number of crimes were committed annually?"*

The several objections which I have now urged against existing divisions and isolations of the inhabited surface of this country, I beg to recommend earnestly to the consideration of this section; and I submit that the difficulties in the way of a revision in the census and registration division of the country, for sanitary purposes, are of no great magnitude, and certainly not insuperable.

13. My first practical deduction would be, that no system of territorial distribution of population deserves to be either defended or adopted which does not secure for every portion of the country, whether town or rural parish, the superintendence of a uniform administrative machinery, competent to collect *all returns relating to the numbers, the vital force, the mortality, the diseases, and the reproduction of the population*, as well as to carry into effect all sanitary precautions. Now, in order to provide this general benefit, the boundaries of the registration districts ought to be revised with reference to physical topography, and the subdistricts, especially, should be so contrived, that, if possible, each may contain a population under the same physical circumstances,† while its shape and extent should be such as to admit of easy and convenient intercommunication among its inhabitants.

14. By statistics of disease, I mean returns of all sickness and accidents attended by the medical officers of districts; all such ailments as are medically relieved in those noble

---

* Essays on State Medicine, pp. 334-5.

† Where any sub-district necessarily includes persons living in very different localities, the vital statistics of those places should be separately returned.

hospitals and charitable dispensaries, which succour more than half of the labouring classes of England; all sickness occurring among bodies of workmen in public employ, or in legally established clubs and provident societies. Such a registration should have special regard to the causation of disease, and to its relation with residence and occupation. And this invaluable mass of information, now lost for want of collection, should be registered by the same machinery as that employed for registering the births and deaths of the people.

Meteorological observations, and the varying physical conditions of the animal and vegetable kingdoms, should be concurrently recorded in each superior registration district. And these combined observations and records should be published periodically in each locality for the instruction of its inhabitants; for as these become better informed on the various circumstances which affect their physical well-being, prejudices will subside, habits and manners will improve, opposition to improvements will cease, and local councils will become more useful and effective.

15. A second deduction from my preceding argument is, that the law should no longer confer imperfectly defined powers of a sanitary or reformatory nature upon two or more rival boards in the same place, yet with different and irreconcileable areas of jurisdiction. Now, as neither boards of guardians, nor town councils and other similar bodies, would be likely to consent to a general surrender of their sanitary functions to their rivals, I infer that *new* representative bodies ought to be instituted for the local administration of all matters affecting the public health and the physical condition of the people in every part of the kingdom, with larger jurisdictions than now belong to any of the corporate authorities which the legislature has partially and unsystematically empowered, and to be constituted, in great measure, of delegates from those established bodies. If each of the existing local boards and councils were fairly represented in a new superior court, as the district boards of London are in its metropolitan board, all reasonable objections to the proposed change might be removed.

I have elsewhere shown* how the philanthropic and scientific elements of control might be introduced into a higher kind of local administrative body; and, I would only add, that if these matters were directed in every district by better

---

* Essays on State Medicine, pp. 344-5.

constituted local councils, there would be less excuse for advocating any scheme of a centralising tendency, so repugnant to English notions.

16. Thirdly, as to the extent and form of the proposed jurisdictions. Instead of five hundred and eighty-seven provincial registration districts (I exclude those of the metropolis, both because that is now the subject of a new and somewhat doubtful experiment, and because London must always be dealt with separately and exceptionally), I recommend less than half that number. In other words, each superior district for the collection and registration of vital and sanitary statistics might contain, *on the average*, two or more parochial unions. Existing boundaries should, of course, be followed, unless some obvious advantage were to be gained by altering them; but wherever a correction of boundary might seem to be demanded, the physical geography of the locality should be carefully borne in mind; and, if possible, each parish or cluster of population should be included in that district, the principal town of which would be most easy of access. Special regard should be had to density of population. Where the *specific population* (as the French statists call it) might be under two hundred persons upon an English square mile (three acres and one-fifth to each person), a total population of 40,000 or 50,000 would suffice for the sanitary jurisdiction. Where it might exceed (say) four hundred upon a square mile (giving less than one acre and three-fifths to each person), a population of 80,000 would not be too many; while a much higher amount of population might be included in the case of a first-class town.

Further, every sanitary jurisdiction should be an exact aggregate of a sufficient number of small districts for medical visitation, which should be either identical with the registration subdistricts, or subdivisions of them. The boundaries of the existing union medical districts might be gradually and cautiously revised for the purpose.

17. Fourthly. Another object of great practical importance would be attained by the creation of the proposed larger sanitary jurisdictions. Every facility would then be afforded for the appointment of a superior class of officers of health. The superintendence of the registration of births and deaths; the collection of other statistics affecting life, health, and disease; the scientific observation and record of various natural phenomena; examinations and evidence in aid of forensic inquiries; the supervision of various preventive duties, as

vaccination, measures against and during epidemics, etc.; the inspection of articles of food and medicine; all these and other duties, properly performed, would occupy the entire time of a skilled and experienced superintending officer,* who ought most certainly to be debarred from private professional engagements, and thus be rendered independent of those local influences which are known to be adverse to an unflinching and uncompromising discharge of public duty. Such an officer would be analogous to the *Kreis-physicus* of the German States, whose scientific reports and preventive duties are of great value, and would doubtless lead to more important practical results, if laid before an English community with its practical tendencies and its ample pecuniary resources.

18. The questions involved in the territorial distribution of the population are of the largest importance to society; but I must now close these remarks by a brief recapitulation.

I. The physical geography of the district, and the general character of its population, should be the main facts upon which any revision of the areas of sanitary inquiry and jurisdiction should be founded.

II. Areas for statistical returns should be co-extensive with those for sanitary management.

III. The extent of these areas should be large enough to provide satisfactorily for the amalgamation of existing smaller jurisdictions.

IV. The superior sanitary districts should also be large enough to secure, with economy, the appointment of a higher and more useful class of sanitary officers.

All these changes might be judiciously carried into effect, I believe, without any reckless or offensive sacrifice of existing interests, or any violation of justly established rights.

---

* It might be desirable to divide these functions among two or three officers, with different titles and qualifications. (Essays on State Medicine, pp. 50-1.)

CHOLERA AND THE WATER SUPPLY IN THE SOUTH DISTRICTS OF LONDON, IN 1854.

By JOHN SNOW, M.D.

In the summer of 1849, I published certain conclusions at which I have arrived with regard to Asiatic cholera, and the facts and reasonings which had led to them. The following is a very brief outline of these views. The cholera commences as an affection of the alimentary canal, and not with general illness; there is no evidence of poisoning of the blood in this disease, except in some cases where secondary fever occurs; there is conclusive evidence that cholera may be communicated from person to person, and it follows, therefore, that the morbid matter which produces the disease is applied to the interior of the alimentary canal, where it increases and multiplies during the period of so-called incubation, and passes off, during the attack, to cause fresh cases when suitable opportunities occur. Various circumstances connected with the propagation of cholera seemed in accordance with the above view of its pathology. Thus, it was observed to pass frequently from person to person in the crowded habitations of the poor, who eat, drink, cook, and sleep in the same apartment, and pay little or no regard to cleanliness, who live, in fact, under circumstances where the sudden and copious evacuations of cholera, soiling the bed and body linen, would not fail to contaminate the hands of the patient and his attendants, and be thence transferred to any food they might touch. The absence of colour and odour in the evacuations could not help to favour this result. The social visitor who came to see the poor patient, or attend his funeral, frequently suffered, whilst the medical man, and others who partook of no food in the apartment, and who washed their hands when requisite, escaped. The mining districts of this country have suffered excessively from cholera in each epidemic, an event which might be explained by the following circumstances when taken in connexion with the above view of the cause of the disease. The miners stay eight or nine hours at a time in the pits, and take food with them, which they eat invariably with unwashed hands, and without knife and fork, whilst the pits are without privies, and are generally extremely foul and dirty. The entire absence of daylight must also cause the workmen to take much more dirt with their food than they aware of. It occurred to me, as soon as I began to entertain the above opinions, that if the cholera excreta could reproduce the

disease in the way just mentioned, they might also do so when diffused in water taken as drink, and that unless this were the case, the whole of the phenomena of cholera, as an epidemic, could not be explained. I, therefore, sought anxiously, and waited patiently, for some confirmation of this part of the subject before I should make my views known. Two outbreaks of cholera occurred, however, about the end of July 1849, one in Horsleydown, and the other in the Wandsworth Road, which I investigated, and which afforded what I considered conclusive evidence on the subject. The water drank by the persons attacked in each of these outbreaks had received, amongst other impurities, what must have come from a patient previously ill of the disease. I was able also to point out that the cholera was prevailing most in those districts of the metropolis which received their supply of water from certain parts of the Thames which contained the sewage of the town, and, consequently, whatever proceeded from the cholera patients. Before the end of 1849 I was able to show that a very close connexion existed between the mortality from cholera and the nature of the water supply, not only in London, but throughout the country. This connexion was very evident in certain towns, as Exeter and Hull, where the supply of water had been changed between the epidemic of 1832 and that of 1849. Where a polluted supply was changed for an unpolluted one, the cholera was almost prevented; and where a scanty but unpolluted supply had been changed for one contaminated with the sewage of the town, the epidemic prevailed to a fearful extent. The attention of Dr. Wm. Budd and Dr. Farr was directed to this subject, with the result of confirming what I had stated.

Between the epidemics of 1849 and that of 1853, one of the water companies supplying the south districts of London changed its source of supply from the middle of the town, near the foot of the Hungerford Suspension Bridge, to Thames Ditton, at a part of the river which is beyond the influence of the tide, and, therefore, out of reach of the sewage of the metropolis. In the autumn of 1853 it was shown by Dr. Farr* that the districts partly supplied by this, the Lambeth Water Company, with improved water, suffered less than the districts supplied entirely by the Southwark and Vauxhall Company with the water from the river at Battersea Fields, although in 1849 they had suffered rather

* Weekly Returns of Deaths, November.

more than the latter districts. By showing the water supply in subdistricts, and thus getting a more correct line of demarcation, I was able to point out* that the advantage in favour of the population partly supplied with the purer water was even greater than Dr. Farr had indicated.

I had learnt from the evidence of Mr. Quick in the *Health of Towns Reports*, that the division of the houses, between the Lambeth Company on the one hand, and the Southwark and Vauxhall Company on the other, was not such as obtains in the north districts of London, where a parish is often divided between two water companies, but where one company always leaves off at the point at which the other begins. Throughout the greater part of Lambeth and Southwark, the whole of Newington, and a part of Camberwell, however, the supply of the two companies above mentioned is actually intermixed, the pipes of both companies going down the same streets, in consequence of the active competition which once existed between three water companies, two of which have since amalgamated and come to an agreement with the other—the Lambeth company. Observing, therefore, when the cholera returned in 1854, that there was the same advantage in favour of the districts partly supplied with water from Thames Ditton, I determined to make an inquiry, the idea of which I had previously entertained. It was obvious that, if the diminished mortality depended on the improved supply of water, the benefit of the whole diminution would be enjoyed by the inhabitants of houses having this supply, whilst the population receiving impure water would suffer as much as that of the districts which received the same water, and no other. This point could be determined by ascertaining the water supply of every house in which a fatal attack of cholera might occur. After commencing the inquiry I found that the circumstances were calculated for affording even more conclusive evidence than I had anticipated. The pipes of the two water companies not only passed down all the streets, but into nearly all the courts and alleys. A single house often had a different supply from that on either side. Each water company supplied alike both rich and poor, and thus there was a population of 300,000 persons, of various conditions and occupations, intimately mixed together, and divided into two groups by no other circumstance than the difference of water supply. One group supplied with water contaminated, to a large extent,

* On the Mode of Communication of Cholera, 2nd edit., p. 73.

with the sewage of London, and the other receiving a supply altogether free from such impurity.

I took great care to ascertain the nature of the water supply correctly in every instance. I did not rest content with the mere reply of the resident, or the appearance of the water, without other evidence, such as the production of the receipt for the water rate. I was also assisted very much by the application of a chemical test to the water, for throughout all the dry weather, which lasted whilst my inquiries were being made, a mixture of sea water extended further up the Thames than usual, and the water of the Southwark and Vauxhall Company contained nearly forty grains of common salt per gallon, whilst that of the Lambeth Company contained only ·95 of a grain. These analyses were verified in numerous cases where the source of the water could be proved clearly by other evidence. For the first four weeks of the epidemic I employed the list of deaths from cholera published in the Weekly Returns of the Registrar-General, and for the next three weeks, during which my inquiry extended, I was kindly permitted to copy the addresses of persons dying of cholera at the General Register Office. My personal inquiry extended over every subdistrict to which the supply of the Lambeth Water Company extended, and it, therefore, included all the area in which the supply of the two companies was intermixed in the manner explained above.

At the time I was making my inquiry, the entire number of houses supplied by each water company was known, from a return made to Parliament, but the number of houses supplied in each district and subdistrict by each company respectively was not known. In order, therefore, to see the exact bearing of my results, I found it desirable to extend the inquiry over the districts supplied exclusively by the Southwark and Vauxhall Company; for this purpose I obtained the assistance of Mr. Whiting, a medical man, who took great pains with his part of the inquiry, which was merely to ascertain whether the houses in which fatal attacks had taken place were supplied by the Southwark Company, or from some other source, as a pump well or tidal ditch. His inquiry extended over the first four weeks of the epidemic.

I gave a copy of the first results of my inquiry to Dr. Farr, to whom I was indebted for facilities very kindly afforded: and Dr. Farr being much struck with these results, instituted a continuance of the inquiry through the district

registrars, who were requested to make a return of the supply of water to each house in which a fatal attack of cholera might occur in all the south districts of London. As the registrars could not be expected to make a chemical analysis of the water, or to seek out the landlord or agent in cases where the tenant was not acquainted with the water supply, the question remained unanswered in a considerable number of instances, but the return was obtained for more than three-fourths of the deaths, and shows, no doubt, the correct proportion. Dr. Farr's inquiry commenced from the 27th of August, and extended to the close of the epidemic; and as my inquiry extended to August 26th, the water supply was obtained for the whole epidemic of 1854. It was only necessary to make a computation of the small number of attacks occurring in houses supplied by pump wells or some other source, in the three weeks—the 5th to the 7th inclusive—of the epidemic, in Bermondsey and the other districts which do not receive the Lambeth water. This computation was made according to the result ascertained in the previous four weeks, and must approach very nearly to the truth.

In treating of the general results of this inquiry, it is desirable to divide the epidemic into different periods, as the influence of the water supply was found to diminish in relative intensity as the epidemic progressed. In the first four weeks of the epidemic of 1854, that is, from July 9th to August 5th inclusive, there were 334 deaths from cholera in the districts to which the supply of the two water companies we are considering extends. The water supply in every one of these instances was made a matter of personal inquiry, and the result of each case was published by me in detail in the Appendix to a work on Cholera. In 286 instances the supply of the house in which the attack took place was that of the Southwark and Vauxhall Company; in 14 instances it was that of the Lambeth Company; in 4 cases the supply was from a pump well; in 26 cases the water was drawn direct from the river, or a canal, or a tidal ditch; and in 4 cases the supply could not be ascertained, owing to the address of the deceased persons, prior to the fatal attack, not being known. The number of houses supplied by the Southwark and Vauxhall Company was 40,046, having a population estimated by the Registrar-General* at 266,516, and the number of houses supplied by the Lambeth Company

* Weekly Returns for 1854, p. 433.

was 26,107, with an estimated population of 173,748; the mortality from cholera was, therefore, at the rate of 107 to each 100,000 inhabitants supplied by the former company, and 8 to each 100,000 supplied by the latter; in other words, the disease was between thirteen and fourteen times as fatal to the population having the impure water as to that having the improved supply. It is particularly worthy of remark that, during the four weeks of the epidemic we are now considering, there were but 563 deaths from cholera in the whole metropolis, of which 286, or more than one-half, occurred amongst the customers of the Southwark and Vauxhall Company, who comprise a little more than one-tenth of London, and a considerable number of the remaining deaths took place amongst mariners, and others employed amongst the shipping, who almost invariably draw their drinking water directly from the river; it is, therefore, evident that at this early period of the epidemic the impure water of the Thames was almost the exclusive means of the propagation of the malady.

In the next three weeks of the epidemic there were 1,180 deaths from cholera in the districts supplied by the two water companies. Of these, the fatal attack took place in 977 cases in houses supplied by the Southwark and Vauxhall Company; in 84 cases in houses supplied by the Lambeth company; in 101 instances the supply was from some other source; and in 18 cases it could not be ascertained, for reasons previously stated. Taking into account the population supplied respectively by each company, the mortality was, at this period of the epidemic, nearly eight times as great in that supplied by the Southwark and Vauxhall Company as in that supplied by the Lambeth Company.

During the last ten weeks of the epidemic, from August 27th to November 4th inclusive, 3,564 deaths occurred in the districts to which the supply of the two water companies extends, and the returns of the district registrars showed that in 2,443 cases the water supply of the house in which the fatal attack took place was that of the Southwark and Vauxhall Company; in 313 cases it was that of the Lambeth Company; in 207 instances the supply was from pump wells and other sources independent of the two water companies, and in 601 instances the supply was not ascertained.* These numbers show a mortality of 916 to each 100,000 inhabitants supplied by the Southwark and Vauxhall Company,

* Weekly Returns for 1854, pp. 514-18.

and 180 to each 100,000 supplied by the Lambeth Company; consequently, at this period of the epidemic, the mortality was still more than five times as great amongst the population supplied by the former company as amongst that supplied by the latter.

The results of my inquiry into the supply of water were, of course, obtained separately for each district and subdistrict in which the inquiry was made, and were so published; but I was unable at the time to show the relation between the supply of houses in which fatal attacks took place, and the entire supply of each district and subdistrict, on account of the latter circumstance not being known. I expressed myself as follows in an article which I published soon after my inquiry was made: "I hope shortly to learn the number of houses in each subdistrict supplied by each of the water companies respectively, when the effect of the impure water in propagating cholera will be shown in a very striking manner, and with great detail."* This information did not, however, come within my reach till recently, and not even then with all the accuracy I could desire. In the Report on the Cholera Epidemics of London as affected by the Consumption of Impure Water, lately written by Mr. Simon, and published by the General Board of Health, there is a statement of the number of houses supplied by each of the water companies respectively in each district and subdistrict. The line has not been very accurately drawn where a street, as often happens, is partly in one district and partly in another; and thus, in the recent Report, the subdistricts of St. Saviour's, Southwark, Leather Market, Bermondsey, Battersea, and Peckham, have been represented to contain a few houses supplied by the Lambeth Company, although they do not contain any. With regard to Bermondsey, it is stated in a foot note that some ends of streets may have been included which have passed the registration boundary, and this has happened in other cases; but the errors arising from this cause are limited in amount, and cannot much affect the statistical calculations that I have made. There is also a further imperfection in the account of the water supply of the subdistricts. The numbers which are stated to represent the houses supplied by each water company in each subdistrict are found on adding up the tables not to do so, but to represent the number of houses, minus those situated in streets in which no death occurred; the latter being

* Medical Times and Gazette, Oct. 7, 1854, p. 365.

placed all together at the end of each group of subdistricts which constitutes a district. Streets vary in size from one or two houses to two or three hundred, and the small streets would obviously be the most likely to be exempt from mortality; it could, therefore, do little good to distinguish such streets; however, if thought desirable, this could as well have been done by simply stating the number of the houses, without deducting them from the gross number in each subdistrict. The number of houses in these exempted streets is about one-ninth of the whole. Instead of being able to compare, as I could wish, the mortality in the houses supplied by each company with the exact number of houses supplied, I have only been able to compare it with the number of houses in the streets in which deaths occurred. This will necessarily raise the proportion of deaths about one-ninth; but there is every reason to believe that the relative proportion of deaths in the population supplied by the two companies respectively, which is the real object of the inquiry, will remain almost unaltered.

As the first four weeks of the epidemic did not furnish a sufficient number of cases in all the subdistricts to serve for a statistical inquiry in detail, I have commenced by taking the first seven weeks of the epidemic collectively; and the first of the tables which accompanies this paper exhibits the results of my personal inquiry, when placed in connexion with the number of persons and houses supplied in each subdistrict by each water company respectively.* The reader will observe from the last division of the table that the proportion of deaths was, in every subdistrict, very much greater amongst the population supplied by the Southwark and Vauxhall Company than amongst that supplied by the Lambeth Company, and that the relative mortality is nearly the same throughout, except in two or three instances, where there were but one or two deaths for the basis of calculation amongst the customers of the Lambeth Company. The second table shows the results of that part of the inquiry conducted by Mr. Whiting, treated in a similar manner. In the subdistricts here enumerated, which were supplied, except just on the border of three of them, exclusively by the Southwark and Vauxhall Company, the mortality will be observed to be nearly the same, only a little higher, than

* The numbers of deaths in the third division of this Table and the next, are copied from page 85 of the work "On the Mode of Communication of Cholera".

amongst the population supplied by the same company, and mixed with that supplied by the Lambeth Company, as shown in the previous table. In the third table the figures contained in the two first are collected into a more compact form, to show the result of the inquiry during the first part of the epidemic, arranged in districts. The fourth table contains the results of that part of the inquiry made by Dr. Farr, when compared with the population supplied by each water company respectively. It is necessarily arranged arranged in districts—for the results were so published in the Weekly Returns*—and not in subdistricts. The mortality during the last ten weeks of the epidemic was greater than during the first seven weeks, but the reader will observe that a very great disproportion continues in every district between the mortality of the population supplied by one company and that supplied by the other. There is no district to which the supply of both companies extends in which the mortality is not more than three times as great amongst the persons supplied by the Southwark Company as amongst those supplied by the Lambeth Company, and the general result shows a proportion of ninety-one to eighteen, or more than five to one, as was stated before.

In the fifth table the numbers in the previous ones are added together, and fresh calculations made, so as to show the result of the inquiry for the whole epidemic. The instances in which the water supply was not specified, or not ascertained, in the returns made by the district registrars must evidently nearly all have been cases in which the house was supplied by one or other of the water companies, for, if the persons received no such supply, and obtained water from a pump well, canal, or ditch, there could be no difficulty in knowing the fact. Moreover, as the two water companies are guided by precisely the same regulations, the difficulty in ascertaining the supply is exactly the same with regard to one as the other; I, therefore, concluded that I could not be wrong in dividing the non-ascertained cases between the two companies in the same proportion as those which were ascertained, and I have done so at the foot of table v, in order to obtain a complete view of the influence of the water supply during the whole epidemic of 1854. These general results I have employed as the basis of some further calculations.

In table vi I have copied from the Weekly Returns of the

* Loc. cit.

Registrar-General the mortality from cholera in every subdistrict to which the supply of both, or either, of the water companies extends. I have also calculated the number of deaths which would have taken place in each subdistrict according to the number of persons supplied with water by each company respectively, and in accordance with the mortality ascertained for the whole of the population supplied; and it will be observed that the calculated mortality bears a very close relation to the real mortality in each subdistrict. This relation exists with regard both to the gross mortality and to the mortality to each 10,000 living, all through the table, and proves the overwhelming influence which the nature of the water supply exerted over the mortality, overbearing every other circumstance which could be expected to affect the progress of the epidemic. Thus, in the crowded, dirty, and very poor subdistricts of Lambeth Church, first part, and Waterloo, first part, lying by the river side, the mortality was low in consequence of the water supply being chiefly that of the Lambeth Company; whilst in the thinly peopled, and comparatively genteel subdistricts of Clapham and Battersea the mortality was very high, in consequence of the impure water of the Southwark and Vauxhall Company. Taking this inquiry altogether, and considering that the results which were published two years ago, and could only be estimated collectively, are now corroborated in detail through upwards of thirty subdistricts, it probably supplies a greater amount of statistical evidence than was ever brought to bear on a medical subject.

At the latter part of 1854, the General Roard of Healh procured from the two water companies, by order of the Secretary of State, a list of all tbe houses which they supplied, which lists are very valuable, as affording the means of ascertaining the exact water supply of each district and subdistrict separately. By direction of the Scientific Committee of the Board of Health, the lists have been employed in making a supplemental inquiry into the effect of the water supply on cholera. For this purpose they were compared with the lists of deaths at the General Registrar Office, and the results have been embodied in the recent Report of Mr. Simon, previously referred to. There are, however, certain circumstances, which were probably unknown to the Scientific Committee, and which render it impossible that an inquiry, conducted in this manner, could do more than approximate to the truth; and show why it can bear no comparison in point of accuracy to a personal inquiry, made on

the spot, at the time of the epidemic. In the first place, throughout the greater part of Lambeth, Newington, and the Borough, the houses are either without numbers, or numbered very irregularly, and the numbers are liable to frequent change, as new houses are built, or older ones re-painted; there are also frequently repetitions of the same number in the same street, and although, in some instances, the companies have returned the names of the occupiers, that can be of no assistance in the case of the poor, who occupy but one or two rooms, and form the greater bulk of the population. In the next place, the poor often furnish, unintentionally, a wrong number to the registrar, even when the houses are regularly numbered. They know their own homes perfectly, but, having no occasion to refer to the number, they partially forget it; and, in the greater number of my personal inquiries, I had to call at two or three houses before I found the one in which the death occurred. For these reasons it follows that, in comparing the lists of the water supply with the lists of deaths, many errors must have occurred; and as the deaths were six times as numerous in the houses supplied by the Southwark and Vauxhall Company as in those supplied by the Lambeth Company, the evident result would be that out of every six mistakes five would transfer a death from the former company to the latter, and only one would transfer a death from the latter company to the former. Another source of error, but operating to a less extent, is, that a number of persons who were attacked with cholera in houses supplied by the Southwark Company died in the workhouses of St. Saviour's, Lambeth, and Newington, which were supplied by the Lambeth Compan. It need excite no surprise, therefore, that the supplemental inquiry, embodied in the recent Report, instead of showing a mortality of 160 and 27 for the population supplied by the two water companies, or a difference of 6 to 1, showed a mortality of 125 and 37 per 10,000, or a difference of only $3\frac{1}{2}$ to 1. It must be obvious, however, independently of the above facts, that a difference of three and a-half to one would not explain the great difference in the mortality of the various districts and subdistricts. The epidemic of 1853 is included with that of 1854 in Mr. Simon's Report; but as there were but few deaths in 1853, and those chiefly amongst the population supplied by the Southwark Company, this circumstance would not much affect his results.

It is probable that, when the facts brought to light by this inquiry are sufficientiy known, no one will deny the in-

fluence of impure water in promoting the mortality of cholera; but it must not be supposed that it is mere impurity of an ordinary kind that causes the disease, for there are innumerable facts to prove that ordinary impurities have no such effect, and that it is only when the specific morbid matter of the disease gains access to the water that cholera is propagated. Thousands of people drank water from their own neglected cisterns, during the late epidemic, as impure as that of the Southwark and Vauxhall Company, without ill effect. An inquiry made by the vestry of St. James', Westminster, proved that the contents of a cesspool had been percolating for months through the three feet of earth which separated it from the pump well in Broad Street; but although hundreds of people were daily drinking the water, and cholera was extending fearfully in many parts of London, only a few scattered cases occurred in the streets near the pump till the end of August, when, a case having happened amongst the persons using the privy connected with the cesspool above mentioned, more than five hundred persons were attacked within two or three days.

In the cases in which the cholera poison gains access to a limited supply of drinking water, such as a tank or pump-well, the outbreak it occasions is always sudden, violent, and limited; but when a river is the medium of the propagation of the disease, its progress is more gradual and extended, being diffused amongst the whole population using the water.

It is hardly necessary to remark, that every circumstance which proves the communication of cholera through the medium of water, corroborates the views, explained at the beginning of this paper, regarding its propagation in the crowded houses of the poor; for it cannot be supposed that a morbid matter, which can produce its specific effects after being diffused and distributed through a quantity of water, could fail to act in an undiluted state.

It was my intention to make some remarks on the drainage and water supply of towns, but this communication has already exceeded the limits which I prescribed for it.

Sackville Street.

TABLE I. *Shewing the results of the Author's personal Inquiry in Twenty-One Sub-Districts.*

Registration Districts.	Registration Sub-Districts.	Number of inhabited houses in 1851.	Population in 1851.	Estimated constant population per house.	"Number of houses, and estimated number of persons, supplied in 1854 with water as under." By Southwark and Vauxhall Co. No. of houses.	By Southwark and Vauxhall Co. Estim. Population.	By the Lambeth Company. No. of houses.	By the Lambeth Company. Estim. Population.	Water supply of the houses in which fatal attacks of cholera took place during first seven weeks of epidemic of 1854. Southwark and Vauxhall Co.	Lambeth Co.	Thames, canals, or ditches.	From pump-wells.	Supply not ascertained.	Deaths from cholera in first 7 weeks of epidemic of 1854.	Mortality per 10,000 supplied with water as under. Southwark and Vauxhall Co.	Lambeth Co.
St. Saviour, Southw.	1. Christchurch	1,887	16,022	8·5	343	2,915	1,557	13,234	11	13	0	0	1	25	37·7	9·9
St. George, Southw.	1. Kent Road	2,558	18,126	7·1	1,779	12,630	563	3,997	52	5	0	0	0	57	41·1	12·5
	2. Borough Road	2,069	15,862	7·7	1,176	8,937	878	6,672	61	7	0	0	3	71	68·2	10·4
	3. London Road........	2,365	17,836	7·5	383	2,872	1,533	11,497	21	8	0	0	0	29	73·1	6·9
Newington	1. Trinity	3,224	20,922	6·5	1,661	10,132	1,372	8,370	52	6	0	0	0	58	51·3	7·1
	2. St. Peter, Walworth ..	4,925	29,861	6·1	2,340	14,274	1,758	10,724	84	4	0	0	2	90	58·8	3·7
	3. St. Mary............	2,309	14,033	6·1	489	2,983	899	5,484	19	1	0	1	0	21	64·5	1·8
Lambeth..........	1. Waterloo, part 1	1,729	14,088	8·1	438	3,548	1,474	11,939	9	1	0	0	0	10	25·6	0·8
	2. Waterloo, part 2	2,191	18,348	8·4	864	7,171	1,510	12,533	25	8	2	1	0	36	34·8	6·3
	3. Lambeth church, pt. 1	2,451	18,409	7·5	415	3,113	2,117	15,878	6	9	1	0	2	18	19·2	5·6
	4. Lambeth church, pt. 2	3,849	26,784	7·0	1,124	7,868	2,289	16,023	34	13	0	1	5	53	42·9	8·1
	5. Kennington, part 1 ..	3,977	24,261	6·1	2,586	15,775	444	2,708	63	5	0	3	0	71	39·9	18·4
	6. Kennington, part 2 ..	3,288	18,848	5·7	1,206	7,874	986	5,620	34	3	0	1	0	38	43·2	5·7
	7. Brixton	2,362	14,610	6·1	310	1,922	1,509	9,356	5	2	0	0	2	9	26·0	2·1
	8. Norwood............	600	3,977	6·6	0	0	160	1,066	0	2	5	1	0	8	..	18·7
Wandsworth	3. Wandsworth	1,522	9,611	6·3	144	907	15	94	1	0	8	2	0	11	11·0	..
	4. Putney	918	5,280	5·7	13	74	0	0	0	0	0	1	0	1	..	..
	5. Streatham	1,419	9,023	6·4	0	0	515	3,244	0	1	0	5	0	6	..	3·0
Camberwell	1. Dulwich	259	1,632	6·3	0	0	4	25	0	0	0	0	0	0	..	..
	4. St. George	2,845	15,849	5·6	767	4,295	971	5,437	30	9	0	2	1	42	69·8	16·5
Lewisham	5. Sydenham	801	4,501	5·6	0	0	unkno.	unkno.	0	1	0	2	1	4	..	..
Totals		47,548	317,883	6·6	16,038	107,290	20,554	143,901	507	98	16	20	17	658	47·2	6·8

TABLE II.

Shewing the results of the Inquiry made by Mr. Whiting in Eleven Sub-Districts.

Registration Districts.	Registration Sub-Districts.	Number of inhabited houses in 1851.	Population in 1851.	Estimated constant population per house.	"Number of houses, and estimated number of persons, supplied in 1854 with water as under." By Southwark and Vauxhall Co. No. of houses.	By Southwark and Vauxhall Co. Estim. Population.	By the Lambeth Company. No. of houses.	By the Lambeth Company. Estim. Population.	Water supply of the houses in which fatal attacks of cholera took place during first seven weeks of epidemic of 1854. Southwark and Vauxhall Co.	Lambeth Co.	Thames, canals, or ditches.	Pump-wells.	Supply not ascertained.	Deaths from cholera in first 7 weeks of epidemic of 1854.	Mortality per 10,000 supplied with water as under. Southwark and Vauxhall Co.	Lambeth Co.
St. Saviour, Southw.	2. St. Saviour.........	2,713	19,709	7·3	2,238	16,337	123	898	115	0	10	0	0	125	70·3	..
St. Olave, Southwark	1. St. Olave............	880	8,015	9·1	961	8,745	0	0	43	0	5	0	5	53	49·1	..
	2. St. John, Horselydown	1,480	11,360	7·7	1,170	9,360	0	0	48	0	3	0	0	51	50·1	..
Bermondsey	1. St. James	2,863	18,899	6·6	3,511	23,173	105	693	102	0	21	0	0	123	44·0	..
	2. St. Mary Magdalen ..	1,865	13,934	7·5	2,301	17,258	0	0	83	0	4	0	0	87	48·0	..
	3. Leather Market......	2,279	15,295	6·7	2,090	14,003	163	1,092	81	0	0	0	0	81	57·8	..
Wandsworth	1. Clapham............	2,657	16,290	6·1	1,106	6,747	22	134	19	0	0	5	0	24	28·1	..
	2. Battersea	1,760	10,560	6·0	1,046	6,276	46	276	42	0	8	4	0	54	66·9	..
Camberwell	2. Camberwell	2,851	17,742	6·2	1,474	9,139	103	639	96	0	0	0	0	96	104·8	..
	3. Peckham	3,457	19,444	5·6	971	5,438	70	392	59	0	0	0	0	59	108·4	..
Rotherhithe	Rotherhithe	2,792	17,805	6·4	1,909	12,218	0	0	68	0	35	0	0	103	55·6	..
Totals		25,597	169,053	6·5	18,777	128,694	632	4,124	756	0	86	9	5	856	58·7	..
Totals of Table I.		47,548	317,883	6·6	16,038	107,290	20,554	143,901	507	98	16	20	17	658	47·2	6·8
Houses in streets where no death occurred....		..	..	6·4	4,500	28,929	3,643	23,338	0	0	0	0	0	0	..	..
Not identified		..	..	6·6	411	2,712	25	165	..	..	..	..	..	..	..	..
Totals of thirty-two Sub-districts .		73,145	486,936	6·6	39,726	267,625	24,854	171,528	1263	98	102	29	22	1514	47·2	5·7

TABLE III.

Shewing the results of the whole Inquiry during the First Seven Weeks of the Epidemic, arranged in Districts.

Registration Districts.	Number of inhabited houses in 1851.	Population in 1851.	Estimated constant population per house.	"Number of houses, and estimated number of persons, supplied in 1854 with water as under." By the Southwark and Vauxhall Co.		By the Lambeth Company.		Water supply of the houses in which fatal attacks of cholera took place during first seven weeks of epidemic of 1854.					Deaths in first seven weeks of epidemic.	Mortality per 10,000 supplied with water as under.	
				No. of houses.	Estimated population	No. of houses.	Estimated population	Southwark and Vauxhall Co.	Lambeth Co.	Thames, canals, or ditches.	Pump-wells.	Supply not ascertained.		Southwark and Vauxhall Co.	Lambeth Co.
St. Saviour, Southwark	4,600	35,731	7·8	2,631	19,617	1,689	14,201	126	13	10	0	1	150	64·4	9·1
St. Olave, Southwark	2,360	19,375	8·2	2,193	18,638	0	0	91	0	8	0	5	104	48·8	..
Bermondsey..............	7,007	48,128	6·9	8,402	57,884	268	1,785	266	0	25	0	0	291	45·9	..
St. George, Southwark	6,992	51,824	7·4	3,419	25,039	3,183	23,712	134	20	0	0	3	157	53·5	8·4
Newington	10,458	64,816	6·2	5,224	31,940	5,473	33,531	155	11	0	1	2	169	48·5	3·2
Lambeth	20,447	139,325	6·8	8,077	54,982	11,763	83,786	176	43	8	7	9	243	32·8	4·9
Wandsworth	8,276	50,764	6·1	3,028	18,390	618	3,870	62	1	16	17	0	96	33·7	3·3
Camberwell	9,412	54,667	5·8	4,005	23,472	1,835	10,478	185	9	0	2	1	197	78·8	8·5
Rotherhithe..............	2,792	17,805	6·4	2,336	14,951	0	0	68	0	35	0	0	103	45·4	..
Sub-district of Sydenham....	801	4,501	5·6	0	0	unknow.	unknow.	0	1	0	2	1	4	..	..
Not identified	..	..	6·6	411	2,712	25	165	..	..	..	..	..	..	..	..
Totals...............	73,145	486,936	6·7	39,726	267,625	24,854	171,528	1263	98	102	29	22	1514	47·2	5·7

TABLE IV.

The Inquiry of the General Register Office during the Last Ten Weeks of the Epidemic.

Registration District.	Number of inhabited houses in 1851.	Population in 1851.	Estimated constant population per house.	"Number of houses, and estimated number of persons, supplied in 1854 with water as under." By the Southwark and Vauxhall Co.		By the Lambeth Company.		Water supply of the houses in which fatal attacks of cholera took place.				Deaths from cholera in last ten weeks of epidemic.	Mortality per 10,000 supplied with water as under.	
				No. of houses.	Estimated population	No. of houses.	Estimated population	Southwark and Vauxhall Co.	Lambeth Co.	Pump-wells and other sources.	Supply not ascertained.		Southwark and Vauxhall Co.	Lambeth Co.
St. Saviour, Southwark	4,600	35,721	7·8	2,631	19,617	1,689	14,201	280	59	0	2	341	143	41
St. Olave, Southwark	2,360	19,375	8·2	2,193	18,638	0	0	186	0	0	23	209	100	..
Bermondsey	7,007	48,128	6·9	8,402	57,884	268	1,785	555	0	0	0	555	96	..
St. George, Southwark	6,992	51,824	7·4	3,419	25,039	3,183	23,712	254	79	0	53	386	101	33
Newington	10,458	64,816	6·2	5,224	31,940	5,473	33,531	303	47	1	174	525	95	14
Lambeth	20,447	139,325	6·8	8,077	54,982	11,763	83,786	349	95	9	231	684	63	11
Wandsworth	8,276	50,764	6·1	3,028	18,390	618	3,870	206	6	73	40	325	112	15
Camberwell	9,412	54,667	5·8	4,005	23,472	1,835	10,478	167	24	113	48	352	71	23
Rotherhithe................	2,792	17,805	6·4	2,336	14,951	0	0	139	0	11	30	180	93	..
Greenwich&sub-dis.Sydenham	..	..	..	..	..	..	..	4	3	..	..	7	..	..
Houses not identified........	..	..	6·6	411	2,712	25	165	..	..	..	..	..	..	..
Totals	72,344	482,435	6·7	39,726	267,625	24,854	171,528	2,443	313	207	601	3,564	91	18

TABLE V.

Shewing the results of the Inquiry for the whole Epidemic of 1854.

Registration Districts.	Number of inhabited houses in 1851.	Population in 1851.	Estimated constant population per house.	"Number of houses, and estimated number of persons, supplied in 1854 with water as under."				Water supply of the houses in which fatal attacks of cholera took place.				Deaths from cholera in the epidemic of 1854.	Mortality per 10,000 supplied with water as under.	
				By the Southwark and Vauxhall Co.		By the Lambeth Company.								
				No. of houses.	Estimated population	No, of houses.	Estimated population	Southwark and Vauxhall Co.	Lambeth Co.	Pump-wells and other sources.	Supply not ascertained.		Southwark and Vauxhall Co.	Lambeth Co.
St. Saviour, Southwark	4,600	35,731	7·8	2,631	19,617	1,689	14,201	406	72	10	3	491	207	50
St. Olave, Southwark	2,360	19,375	8·2	2,193	18,638	0	0	277	0	8	28	313	148	..
Bermondsey	7,007	48,128	6·9	8,402	57,884	268	1,785	821	0	25	0	846	142	..
St. George, Southwark	6,992	51,824	7·4	3,419	25,039	3,183	23,712	388	99	0	56	543	155	41
Newington	10,458	64,816	6·2	5,224	31,940	5,473	33,531	458	58	2	176	694	143	17
Lambeth	20,447	139,325	6·8	8,077	54,982	11,763	83,786	525	138	24	240	927	96	16
Wandsworth	8,276	50,764	6·1	3,028	18,390	618	3,870	268	7	106	40	421	145	18
Camberwell	9,412	54,607	5·8	4,005	23,472	1,835	10,478	352	33	115	49	549	150	31
Rotherhithe	2,792	17,805	6·4	2,336	14,951	0	0	207	0	46	30	283	138	..
Greenwich & sub-dis. Sydenham	..	..	..	..	..	..	..	4	4	2	1	11	..	..
Houses not identified	..	..	6·6	411	2,712	25	165	..	..	..	..	..	..	..
Totals	72,344	482,435	6·7	39,726	267,625	24,854	171,528	3,706	411	338	623	5,078	138	23
Non-ascertained cases distributed in proportion of others	..	..	..	..	..	..	..	561	62	..	..	..	..	..
Population (Registrar-General)	..	..	..	..	266,516	..	173,748	4,267	473	338	..	5,078	160	27

TABLE VI.

The Mortality from Cholera in 1854, *in Thirty-one Sub-Districts, as compared with Calculations founded on the Results shewn in* Table v.

Registration Districts.	Registration Sub-Districts.	Population in 1851.	Estimated population supplied with water as under.			Deaths from cholera in 1854.		Calculated mortality in the population, supplied with water as under.			
			Southwark and Vauxhall Co.	Lambeth Co.	Both Companies together.	Total deaths.	Deaths per 10,000 living.	Southwark and Vauxhall Co. at 160 per 10,000.	Lambeth Co. at 27 per 10,000.	The two Companies.	Calculated deaths per 10,000 supplied by the two Companies.
St. Saviour, Southw. -	1. Christchurch - - - -	16,022	2,915	13,234	16,149	113	71	46	36	82	57
	2. St. Saviour - - - -	19,709	16,337	898	17,235	378	192	261	2	263	153
St. Olave - - - -	1. St. Olave - - - - -	8,015	8,745	0	8,745	161	201	140	0	140	160
	2. St. John, Horselydown	11,360	9,360	0	9,360	152	134	150	0	150	160
Bermondsey - - -	1. St. James - - - - -	18,899	23,173	693	23,866	362	192	370	2	372	156
	2. St. Mary Magdalen -	13,934	17,258	0	17,258	247	177	276	0	276	160
	3. Leather Market - - -	15,295	14,003	1,092	15,095	237	155	224	3	227	150
St. George, Southw. -	1. Kent Road - - - -	18,126	12,630	3,997	16,627	177	98	202	11	213	134
	2. Borough Road - - -	15,862	8,937	6,672	15,609	271	171	143	18	161	104
	3. London Road - - -	17,836	2,872	11,497	14,369	95	53	46	31	79	55
Newington - - - -	1. Trinity - - - - -	20,922	10,132	8,370	18,502	211	101	162	22	184	99
	2. St. Peter, Walworth -	29,861	14,274	10,724	24,998	391	131	228	29	257	103
	3. St. Mary - - - - -	14,033	2,983	5,484	8,467	92	66	48	15	63	74

Lambeth	1. Waterloo, part 1	14,088	3,548	11,939	15,487	59	42	57	31	86	55
	2. Waterloo, part 2	18,348	7,171	12,533	19,704	118	64	115	34	149	76
	3. Lambeth church, pt. 1	18,409	3,113	15,878	18,991	49	27	50	43	93	49
	4. Lambeth church, pt. 2	26,784	7,868	16,023	23,891	195	73	126	43	167	71
	5. Kennington, part 1	24,261	15,775	2,708	18,483	305	126	253	7	260	146
	6. Kennington, part 2	18,848	7,874	5,620	13,494	143	75	126	15	141	105
	7. Brixton	14,610	1,922	9,356	11,278	48	33	31	25	56	49
	8. Norwood	3,977	0	1,066	1,066	10	25	0	3	3	28
Wandsworth	1. Clapham	16,290	6,747	134	6,881	167	103	108	0	108	158
	2. Battersea	10,560	6,276	276	6,552	171	162	100	1	101	152
	3. Wandsworth	9,611	907	94	1,001	59	61	15	0	15	149
	4. Putney	5,280	74	0	74	9	17	1	0	1	160
	5. Streatham	9,023	0	3,244	3,244	15	17	0	9	9	27
Camberwell	1. Dulwich	1,632	0	25	25	0	0	0	0	0	0
	2. Camberwell	17,742	9,139	639	9,778	242	136	146	2	148	151
	3. Peckham	19,444	5,438	392	5,830	175	90	87	1	88	151
	4. St. George	15,849	4,295	5,437	9,732	132	83	69	15	84	86
Rotherhithe	Rotherhithe	17,805	12,218	0	12,218	283	159	196	0	196	160
Houses supplied in streets where no death occurred		..	28,929	23,338	52,267	..	..	..	..	..	..
Houses not identified		..	2,712	165	2,877	..	..	..	..	..	..
Totals		482,435	267,625	171,528	439,153	5,067	105	4,282	462	4,744	108
Population as estimated by the Registrar-General		..	266,516	173,748	440,264	..	..	4,267	473	4,740	108

ON THE HYGIENIC TREATMENT OF PULMONARY CONSUMPTION.

By BENJAMIN W. RICHARDSON, M.D., Physician to the Royal Infirmary for Diseases of the Chest.

PRELIMINARY CONSIDERATIONS.

THE progress of hygienic medicine in the last few years is the medical fact of the present age, and the fact that will stand out in boldest relief when the history of this period shall be written by some future Esculapian scholar.

But, rapid and effective as this progress has been, the principles of hygiene are yet but in their infancy. We have learned to appreciate the true value of hygienic principles in the prevention of various diseases, especially those of the epidemic type; and the medical profession, throwing aside all selfish recollections, has been the first to teach the practice of these principles, and to prove their force and vitality. The next step in the way of advancement is to demonstrate that the same principles are as useful and as necessary in the treatment of actual disease as they are in prevention. In this field of labour ground is indeed broken. Our physicians are trusting in part to the ventilation of the hospital ward, and to a careful regimen, for the cure of many of their patients; while Stromeyer and others are showing absolutely that the one and true remedy for the typhus-stricken victim is pure air in abundance.

A great advantage in the hygienic treatment in disease is, that it does not, or at least need not, interfere with sound and experience-proved modes of treatment of a medicinal kind. An ague patient is benefited by hygienic measures, but this is no reason why he should not at the same time be subjected to the well known curative effects of cinchona. An anæmic child is made to inhale pure air, and to exercise its limbs, but this is no reason why it should not also be medicinally plied with steel. In fact, in the hands of the scientific physician, there is always a consistent plan for combining the medicinal and hygienic systems. He sees that the two systems are one; he sees further that the mere medicinal plan without the hygienic is in all cases imperfect, and in some cases worse than imperfect. Will all the medicines in the Pharmacopœia cure small-pox in a patient shut out from the air, and breathing steadily his own poison emanations? The dream of such a possibility is past now.

The practical details of hygienic medicine in relation to the treatment of disease have, however, yet to be wrought

out more fully. This will be sure work, but slow. Necessarily slow, because it is hard to give up old friendships in dogmatism; and to effect a cure in a sick man by fresh air alone, or diet, is infinitely less satisfactory to the public, than to assume to effect the same cure by a bread pill. I know some earnest men in the profession who are afraid to abandon the routine of pills, draughts, lotions, and what not, because such abandonment knocks head against the foibles of those who seek to be cured by such means, and who will recognise no other means. Nor is there want of argument in this course, though its morality may be open to criticism. A dispensary patient came to me lately, to be cured of a headache. I saw what seemed to be the cause, and without prescribing on the letter, gave in words what promised to be the remedy. The patient came no more; but I asked after her casually one day of a friend who brought her to see me. "Oh!" was the reply, "she has no faith in you; you only told her to sleep in a room with a chimney in it, and to sleep alone; so now she is getting cooling medicine from a druggist, and some days she is worse, and some days she is better." Always worse, I take it, after the cooling medicine. It would be easy to multiply these illustrations, but this one is a fair representation of others.

It is vain, it is sticking in the slough of hopelessness, to pander to these popular imbecilities; for though they must die out, and, indeed, are dying out daily, they will go the sooner if they are effectually damped, and if something real and common sense is put in their place. *Scientiæ mutantur, et nos mutamur in illis.* There is a time when medicines are invaluable; but if faith in medicines is to be retained, the times for their administration, as well as their selection, must be learned by knowledge, not by routine; and must be dictated by the circumstances of the case, not by the caprice of the patient. The executive of science must be independent, if it would keep in the path of truth and advancement.

In such progress as has been made in the science of treatment by medicines, it has been found useful to take up certain particular diseases, and to observe in them, individually, the effects of particular remedies. This rule will apply with equal force in considering and investigating hygienic modes of treatment. Each practitioner should, as his opportunities permit, observe as carefully the effects of his hygienic commands, as he does those of the medicines he may prescribe. He should compare also the one mode with the other, and calculate in each case their relative advantages.

In this way he will have the advantage of detecting with greater accuracy the pure effects of medicines themselves; seeing that the action of medicines is greatly modified by the external conditions to which he who takes them is subjected.

Convinced of the importance of the above considerations, I have made it my business for some time past to mark out a series of hygienic rules for the treatment of consumptives; and as I have been happily favoured by the best and widest opportunities of carrying out these rules in practice, and as the results have been most satisfactory, I lay the views, given in succeeding chapters, respectfully and briefly before the profession and the public, but without making the proposition of anything like a specific cure for the disease in question.

The idea of a hygienic code for consumptives is by no means new, but it has as yet been limited and incomplete. On the diet of consumptives volumes have been written, and specific diets have been invented as abundantly as have specific pills and plasters. Out-door exercise also, the necessity of which it will be my task earnestly to enforce, has been often urged, and some conscientious men have earned for themselves not a little disrepute by the pertinacity with which they have pressed their views on this point on the attention of the public. An American physician, Dr. Parrish, in a number of the *North American Medical and Surgical Journal* for 1830, wrote thus:—

"Vigorous exercises, and a free exposure to air, are by far the most efficient remedies in pulmonary consumption. It is not, however, that kind of exercise usually prescribed for invalids—an occasional walk or ride in pleasant weather, with strict confinement in the intervals—from which much good is to be expected. Daily and long continued riding on horseback or in a carriage is, perhaps, the best mode of exercise; but where this cannot be commanded, unremitting exertion of almost any kind in the open air, amounting even to labour, will be found highly beneficial. Nor should the weather be scrupulously studied. Though I would not advise a consumptive patient to expose himself recklessly to the severest inclemencies of the weather, I would, nevertheless, warn him against allowing the dread of taking cold to confine him on every occasion when the temperature may be low, or the skies overcast.

"I may be told that the patient is often too feeble to be able to bear exertion; but except in the last stage, where every remedy must prove unavailing, I believe there are

few who cannot use exercise out of doors; and it sometimes happens that those who are exceedingly debilitated, find, upon making the trial, that their strength is increased by the effort, and that the more they exert themselves the better able they are to support the exertion."

M. Salvadori, of Trent, and a Mr. May espoused a similar view even long previous to the time of Dr. Parrish. These gentlemen, Salvadori and May, proposed and carried out, for consumptives, the plan of supplying them freely with the most nutritious foods, such as beef and wine, and of subjecting them also to vigorous exercises, such as climbing mountains and taking prolonged walks. Salvadori trusted to this alone, and ignored medicines. Mr. May used bark, opiates, and emetics, and conjoined a swinging gymnastic exercise to his treatment.

Dr. Rush gave an opinion that exercise in the cold air was useful in hæmoptysis, and commends the hardship of active military service as the most effectual remedy in many cases of confirmed consumption.

Recently Dr. Jackson, another American physician, has taught the same doctrine in his work entitled *Letters to a Young Physician*, and has gone further than Dr. Parrish towards forming an extended hygienic system of treatment. He has given instructions on diet and clothing, but his great argument, like that of his predecessor, is in favour of exercise, and of free exposure at all times to a pure air, in consumptive cases.

I must not omit to refer also to the opinions of Dr. M'Cormac, which practically run in the same direction, but which are connected with a theory held by him as to the origin of tubercle. It is apart from my present purpose to discuss the question of the origin of tubercle, and I therefore need only refer to the fact, that pure air in abundance is, in the opinion of Dr. M'Cormac, the essential preventive against the commencement of consumption, and the most essential remedy when the disease has made its appearance.

OUTLINE OF A HYGIENIC CODE FOR THE TREATMENT OF CONSUMPTIVES.

In giving the following rules I presuppose their general applicability to cases of consumption in all stages of the disease: in the premonitory stage; in the stage when the tubercular deposition is apparent; and in the next stage, when the local mischief is much further advanced. In the last stage even, though hope is lost, many of the rules may still

be rigidly followed out with advantage, for by them the course of the disease is smoothed, and sometimes life is prolonged. In like manner, the rules are generally applicable to those who by hereditary taint are as yet but predisposed to the disease.

Rule i.—*A supply of pure air for respiration is the first indication in the treatment of the consumptive patient.* In all cases of consumption, the attention of the physician should be at once directed to the quality of the air breathed by the patient. It may seem dogmatical, but it is true, that in an atmosphere containing one per cent. of the carbonic acid of the breath, with the natural but as yet undetermined amount of ammonia evolved with the carbonic acid, in such an atmosphere a consumptive patient, though in the earliest stage of the disease, cannot possibly recover under any form of medicinal treatment; while in those predisposed to the disease, the inhalation of such an atmosphere, even at intervals, will aid materially in inducing the first symptoms of the disease. In saying one per cent. of carbonic acid, I have taken a high figure, because it is known that in health the respiration of such an atmosphere for a long time is hurtful. How much more so in consumption, where the patient, by reason of the imperfect play of the lungs, is already taking in too little air!

In large cities, and even in small towns, it is next to impossible to get a constantly pure air in inhabited houses, for houses are built according to false notions of comfort. "What a nice cozy room," is a common expression applied innocently to every place where the greatest care has been taken to make an air vault, without a "draught," and all ready for being charged with invisible impurities.

In a cozy room the consumptive is bound never to live, nor in any room indeed for great lengths of time. So long as he is able to be out of doors, he is in his best and safest home. In the fields, on the hills, wherever the fresh air vivifies, where plants look most vigorous, and animals frisk about in the joy of health, there will the consumptive draw in his choicest medicine, there dissolve and throw off most freely the germs of his disease, and there repair most easily the tissues he has lost.

The inclemencies of the weather may temporarily, it is true, prevent the patient from his out-door existence. But even these inclemencies are not so much to be dreaded as confinement in a house. I had occasion, some time since, repeatedly to remark that if, from a few days rain, the con-

sumptives under my care were confined to their homes, instead of being able to take the daily out-door breathing always prescribed, under such circumstances the aggravation of symptoms was always marked and universal. The appetite fell off, the debility became greater, the mind was less buoyant, the local mischief increased. The patients, too, previously accustomed to a full dose of the air food, were not ignorant of the cause of these changes, for reduction in air is felt as quickly as reduction in common diet. Seeing these evils, then, I have lately thrown off the alarm about bad weather, and have ordered every patient to seize on an inclement day each gleam of sunshine, for the purpose of getting out for a breath of fresh air. The result of this practice has been most gratifying in all cases where the courage of the patient has admitted of its application.

Dr. Jackson, in speaking of out-door life, in much the same terms as the above, dwells very properly on the necessity of securing for this plan the confidence of the patient. The treatment "should not be done rashly, but boldly." If possible, "the patient should be made to have faith in it; for without this he is not likely to pursue it as far as he can, and then he will not derive from it all the benefit which it can afford." This is the fact; but the difficulty is at once got over if, under favourable conditions, the invalid can be induced to try the measure for a few days. Once tried, there is no fear, in the majority of cases, of its being given up, except in instances where the disease is too far advanced, or where, from the poverty of the patient, the pursuit of a sedentary occupation must needs be followed, even to the last days of existence; for the benefit derived from the proceeding is so plain, the debility is so much better borne, the relish for food is so much more markedly felt, the nights are passed with so much less of restlessness and cough, and with such an increase of sleep, that the sufferer soon instinctively feels the value of his instructions, and follows them out even more punctually than those which relate to the taking of medicines.

As much of the day, then, as is possible should be spent by the consumptive in the open air, and in places where the air is least impeded and least corrupted. When he is compelled to keep the house, the necessary precautions must again be taken for procuring a free admission of the atmosphere. No cozy room with a temperature at 70°, with every crevice closed, and with an atmosphere in a dead calm and laden with impurities, should be permitted. But the temperature

should be from 55° to 65° Fahr.; the fire, if there is one, should be in an open grate; and by perforated panes in the windows, and a free chimney vent secured by an Arnott valve, the freest possible current of air should be kept circulating through the room. If the patient is cold, let him approach the fire, but let him not labour under the popular and fatal error, that the way to obtain animal warmth is to shut out the air and roast the body. The heat of the body is made in the body itself, by virtue mainly of the oxygen supplied in the air; and as the body absorbs external heat with great difficulty, it would be as wise to attempt to give warmth by fires, hot bottles, and hot air, to a man who is not inhaling a due amount of oxygen, as to attempt the same process on a marble statue. In a word, external heat is useful only in preventing the too rapid radiation of animal heat from the surface of the animal body. Alone, it cannot supply heat; but when a wholesome air is inspired, it can secure the retention of the heat that is manufactured in the animal furnace.

I spoke a moment ago of the open fire-grate. This is an essential for the room of the consumptive. Stoves of all kinds, heated pipes, and, in a word, every mode of supplying artificial warmth, except that obtained by the radiation from an open fire, is, according to the facts which I have been able to collect, injurious. It is injurious, because by such means the air is made too dry, an objection much less applicable to the open fire. If compelled to live in a room heated by a stove or by hot water pipes, or if the air in a room heated by an open fire be too dry, as may occur during north-east winds, the consumptive patient should meet the difficulty by allowing the steam from boiling water to be diffused through the apartment. I have known a patient to be kept awake with constant dry cough during the whole night from what seemed, in great part, the dryness of the atmosphere, and have been able to afford relief by the simple suggestion named above.

But the evil effects arising from the common closed stove are as nothing compared with the system of heating an apartment by hot air passing into the room from an iron flue. It is a fortunate fact that this monstrous mode is now fast going into disuse, for a second time in this country. The air thus heated bears with it minute irritating particles, which to healthy lungs are hurtful, and to phthisical lungs fatal.

The symptom which I have most commonly seen elicited in the phthisical, by the inhalation of an unnaturally dry air,

is hæmoptysis, a symptom brought on possibly by the constant cough which the dry air excites. This effect, in a minor degree, will, in fact, appear in some cases without any actual deposition of tubercular matter under the influence of the cause just described. A gentleman whom I knew, and whose lungs were free from tubercle and other organic disorder, was constantly annoyed and troubled with slight attacks of hacking cough and blood-spitting. He was at a loss to account for the cause. At last he detected that the attacks always commenced when he was at work in his study. With the idea of being very warm and comfortable, and ignorant of the nature of animal heat, he had introduced into a small room a large Burton's stove. To a stranger entering that room when the stove was in action, and the doors and windows snugly closed, the heat and dryness of the atmosphere would have been at once oppressive; but he, a close student, and constantly occupying the room under such conditions, had become accustomed to it as regards external sensation, but caught the mischief effectually in the chest. The cause of the symptoms being explained, the stove was abandoned, and the open fire-grate was again resorted to: the cough and blood spitting at once disappeared without the administration of any medicine. A few weeks afterwards, thinking that the stove and the cough might only stand in the position of coincidencces, our student resumed the use of the stove: and what is more, resumed also, as an effect, the cough and the blood expectoration. This time he became assured that the stove and cough stood in the relation of cause and effect. The cause was once more removed, and ever since he has remained free of the effect.

The temperature of the air in the room of the consumptive should range from 55° to 65° Fahr., and he himself should learn to observe by the thermometer that he is living in an air of this degree of warmth. Bennett's shilling thermometers answer for this purpose admirably, and come within the means of the poorest patient.

I must say a word about schoolrooms in this place. If any father or mother have a child of consumptive tendency, I beg them to send him to no school until they have personally inspected the schoolroom, in regard to its ventilation and to the mode in which it is warmed.

The worst constructed stoves, the worst plans of ventilation, are, I regret to say, to be found in these public rooms, even in those of the best class; and boys are not uncommonly punished for being stupid, when they are really in a semi-

torpid state from the effects of one of the most active gaseous narcotics—carbonic acid. If a child of consumptive birth be carefully brought up, with strict regard to sound physiological rules, there is always a chance of carrying him fairly into manhood, and beyond the period at which tubercle so commonly presents itself. But if such a child be sent from home to spend six or eight hours a-day amongst a troop of other children, in an unventilated room, dry heated by iron stoves, that child has no chance; his disease is being drilled into him, *pari passu*, with his learning, and the end is forthcoming.

In order to ascertain the degree of moisture in the air, Dr. Arnott recommends the use of the hygrometer. This would be most advantageous, and the sensations of a consumptive patient would soon inform him what degree of moisture was comfortable and proper. But there is yet a desideratum in practical hygiene, to which the Rev. C. Girdlestone drew attention in the JOURNAL OF PUBLIC HEALTH for March 1855; viz., an instrument for indicating at all times the amount of carbonic acid gas present in the air of any apartment, and as simply constructed as the barometer or thermometer.

I have occasionally heard phthisical patients complain of the use of gas in the rooms where they are confined. Such complaints, however, have usually come from patients confined in workshops where the number of burners is very great, and where there is almost always some accidental escape of gas.

In private houses such objections are avoidable; but as the inhalation of coal gas is injurious even in small quantities, and as the products of the combustion of such gas are also hurtful, the necessity of a free ventilation in rooms where it is burned and in which consumptives are lodged, is the more urgent.

The care that should be taken to secure a good air in the living rooms of the phthisical invalid, must extend with equal care to the sleeping apartment. This rule should always obtain when possible; *never permit one room to perform the two offices of bedroom and living room.* The bedroom should be large, unencumbered by needless furniture, and thoroughly ventilated. If the temperature of the air without is not below 60° Fahr., the windows of the room should be boldly set open, and be kept open all night. If they are to be closed of necessity, a free chimney draught must be procured, and an Arnott's valve is always an advantage. In the absence of this, a bent tube may be used, as

described in another page of this work. The bed should be free of curtains, but a single screen may be placed so as to ward off any direct draught from the door or window. Warmth of body is best secured by woollen bedclothes; but if the temperature of the air is below 60°, it will with advantage be raised to that pitch by a fire in the open grate. Gas should on no pretence be burned through the night in this bedroom, and as few other lights as possible, for the patient requires all the air that is to be had, and must not be carelessly robbed of it. Above all things, the consumptive person should be the sole occupant of his own bed and bedroom. To place such an one for several hours close to another person, however healthy, is injurious to both, but especially to the sick. No ties of relationship, and no mistaken kindness, should cause this rule of isolation ever to be broken.

It has been stated already that the room of the sufferer should be large. It should include, whenever practicable, at least 1,000 cubic feet of breathing space, under all plans of ventilation. If more space can be had, all the better. If less only is obtainable, then the ventilation must be the more carefully attended to.

When the patient has left room in the morning, and he should do so early, the windows and doors should be set open, and a current of air be allowed to flow through during the whole of the day. If the air of the apartment be at a temperature below 60° Fahr., or loaded with moisture, the fire should be lighted before bedtime. In thus preparing a bedroom for the reception of the sick, I have known nurses, either in ignorance or in idleness, take up a chaffer of lighted coke, or a warming-pan full of live coals, and set it in the centre of the room to effect the "airing" process. This act is nothing less than a systematic diffusion of coke poison.

Use of respirators.—Consumptive patients frequently ask, especially in winter time, the value of what are called respirators; and I have known some poor people to purchase things of this description at what was to them considerable cost. The use of mufflers, which are, in fact, respirators, has been known for ages; and Dr. Hales, more than a century ago, recommended a scientifically made muffler for persons obliged to enter into places where noxious gases were given off. Dr. Beddoes too, as Dr. Arnott shows, pointed out, in the year 1802, that a few folds of gauze held over the mouth and nose made the air warm and moist for respiration, and that such mufflers were, therefore, useful to consumptive

and asthmatic persons. The object of the muffler or respirator is this; it retains the heat thrown out in the expired air, and gives up this heat to the cold air that enters in inspiration. In cold dry weather the muffler is very useful, and should be worn by all phthisical patients when out of doors; but when the air is moist and cold it sometimes is complained of, as embarrassing the respiration. It should then be thrown aside. Any patient may easily make one of these mufflers for himself, for the cost of a few pence, out of a piece of fine wire gauze, cut oval so as to cover the mouth and nose, and fixed in the centre of a handkerchief, so that it may be tied on like an ordinary comforter, with the gauze in the centre for breathing through.

Before leaving the subject of pure air as a remedy for the consumptive, I regret to be obliged to offer an opinion which is, I know, exceptional, and which is therefore given with the firmness of a conscientious conviction, but with the respect due to the opinions of the majority. I am about to speak of the confinement of consumptives in hospitals. That a vast deal of good is, or may be, done at these institutions by the treatment prescribed by the physicians who attend at them, and whose lives are devoted to the study of the disease, there cannot be a doubt. But that it is either physiological, or sound practical treatment, to receive into these buildings consumptive patients, is an assumption I must most earnestly dispute. I know the excellent spirit in which institutions of this kind are founded. I am fully aware of the care that is bestowed on the inmates; of the attempts that are made to introduce every hygienic improvement; of the order and cleanliness that prevail; of the kindness of the attendants; of the excellence of the diet roll; and of the skill of the physicians. With all this, it is to me as clear as crystal, that to bring phthisical patients into such institutions is a great charitable mistake. The very care, and waiting servant attention, that is paid to such of the invalids as are in the first and second stages of the disease, is a cruel kindness. The remedy for them is to encourage and urge them to assist themselves, and to exert themselves. Moreover, no kind of hygienic system, carried on in a large building filled with inmates, can make the air of that building in any way equal to the outer air, which it is so necessary that the consumptive person should breathe. Twenty patients, lying in one hospital ward, will throw off per minute into the air of the ward at least three and a half cubic feet of expired and impure gases, rendered in the phthisical the more

impure by the pathological condition of the lungs. But the impure air thus exhaled vitiates by its diffusion twenty times its own volume of pure air; so that, in fact, in a ward with twenty patients, there are not less than seventy cubic feet of air spoiled per minute, and rendered unfit for the purposes of life. It may be granted that during the day, when the wards are less full, and many windows are open, and the movements of the inmates are active, the expired air may be fairly disposed of. But take a winter night of twelve hours; consider that in this period of time the twenty patients would, if they exhaled even naturally, vitiate fifty thousand four hundred cubic feet of air, which ought to be removed, and to be replaced by two thousand five hundred and twenty cubic feet of *pure* air for the use of respiration; and then reflect whether it is probable that such a ward can remain during the whole night uncontaminated. For, granting to the twenty patients a breathing space of twenty-six thousand cubic feet, and even then it would require that the whole of the air in that space should be removed and replaced by fresh air fully twice in the one night. Against this, possibly, the artificial ventilating argumentists will urge that such a feat of ventilation is nothing at all, not worth considerng, so easy to be done. M. Grouvelle would probably undertake to effect such interchange eight times in the night, or more; and if he undertook to do it eighty times, and did not succeed in doing it once, it might be difficult to prove the fact against him. But if he would take a strip of paper prepared for ozone, place it in a ward, however artificially ventilated, and place another similar paper in the open air adjoining the ward, it is a mistake if he should not find that there was a striking difference in the process of oxidation in the two localities; and that the great life supporter, oxygen, was in a condition to play a very much more active part in its out-door than in its in-door work.

The misfortune of a great hospital, with all its rooms communicating indirectly with each other, is, that the ventilation is always uncertain. There is, in fact, no properly ventilated space except the great vault of heaven, and no true ventilating power except in the combinations of atmospheric pressure, wind movements, and the force of diffusion.

If special hospitals for consumptives are to be had, they should be as little colonies, situated far away from the thickly populated abodes of men, and so arranged that each patient should have a distinct dwelling place for himself. They should be provided with pleasure grounds of great extent, in

which the patients who could walk about should pass every possible hour in the day; and with glass covered walks overhead, where they could breathe open air, and yet be dry, even if rain were falling. Very expensive such an establishment would be, there is no doubt; but it would, I take it, be infinitely more practically advantageous to treat ten patients in this manner, than ten tens in a confined brick and mortar box, through which of necessity some amount of invisible impurity, some trace of transparent poison cloud, is constantly floating.

The strongest argument in favour of consumption hospitals is, that they receive those members of the community who could not at their own homes afford the same advantages as are supplied to them in the charity. Against this it is to be urged that the patients taken into the consumption hospitals are *not*, in this country at least, in any way to be considered as the representatives of the most needy and destitute sections of the community. These latter go to their last homes in the workhouse, or in their own poverty stricken dwellings. The classes that fill the hospitals are often many grades above destitution; and are sometimes comparatively wealthy. They have access to a governor who gives them an admission letter, and they leave their own medical adviser to enter the hospital, not because they cannot find the means to live at home and be treated at home, but because, catching at every new suggestion offered to them, they set their hearts on getting into the hospital, as though it were a certain haven of rescue. In this scramble after admission some of course succeed; they leave their homes, they enter the hospital, and there the greater proportion of them either die or return back to their friends nearer death than before. A few recover or are relieved; but whether the same result would have occurred, if they had been subjected to the same medical and general treatment out of the hospital? is a question which may be left very safely answered in the affirmative.

Rule ii.—*Active exercise is an essential element in the treatment of Consumptives.* The conditions for obtaining a due supply of air imply in some measure the necessity for exercise. But there are varieties of exercise. We have seen that Drs. Rush, Jackson, and Parrish are in favour of riding on horseback, but this is a thing not practically to be carried out in the majority of cases, and, as I think, not absolutely necessary. Walking is the true natural exercise, and the best, for it brings into movement every part of the body more or less, and, leading to brisker circulation in every part,

causes a more active nutrition generally. The extent to which exercise should be carried will vary with the stage of the disease, and temporary accidents may for the moment stop it altogether, such, for instance, as an attack of hæmoptysis. But when exercise is advisable, the general rule is to recommend that it be carried out systematically, cautiously, and courageously, and that each exercise should be continued until a gentle feeling of fatigue is felt through the whole muscular system. Violent and unequal exertion of the upper muscles of the body is unadvisable. When restored from the fatigue of one exertion, another should be undertaken, and during the day this cannot be too often repeated. If the day be wet, then the exercise should be effected by walking in a large room, or by engaging in some game, such as skittles, billiards, or tennis.

If, in his waking hours, the consumptive patient can keep himself occupied pretty freely in muscular labour, he secures the best sudorific for his sleeping hours that can possibly be supplied; for as the cause of force is always expended in producing motion or action, so, to use the words of Dr. Metcalfe, "the proximate cause of sleep is an expenditure of the substance and vital energy of the brain, nerves, and voluntary muscles, beyond what they receive when awake; and the specific office of sleep is the restoration of what has been wasted by exercise." Cough is very much less frequent in the course of the night in him who has been subjected to exercise in the day; while sleep, when it falls, is more profound, more prolonged, and more refreshing.

In summer time, when the temperature of the day is high, the morning and the evening time are the best adapted for the periods of out-door exertion. In the other seasons, mid-day is preferable, as a general rule.

I have sometimes been asked whether what are called gymnastic exercises are commendable in consumptive cases, and whether swinging is good. My idea on these points is that, in swinging, a person is much more usefully exercised when throwing the swing for his associates' pleasure, than in being himself swung. There is, in fact, but little faith to be placed in so-called scientific gymnastics. Anything that a man invents to overtop or compete with nature must needs be paltry. Brisk natural movement of the limbs is all that the consumptive requires. He need not go out of his way after a sham, in the shape of a shampooer; chopping wood is a good gymnastic feat, and playing at skittles is perfect in its way.

The value of exercise is threefold. First, it checks waste of muscular structures, for muscles left inactive undergo a consumption, without any necessity for lung disorder. Secondly, it diverts the blood from the lungs, causes a more brisk circulation through them, and a more free distribution through the system at large. Thirdly, it induces a more free respiration; more oxygen is taken into the lungs, the body is restored to its vital purposes more surely, and, just in proportion as this restoration is effected, so is the restoration of disordered function and of disorganised tissue.

In the performance of muscular exercise let the consumptive never encumber himself, or check the free movements of his body by strappings, loads of clothes, or carrying of weights, and the like. These are but tasks; they lead to unequal exertion in special sets of muscles, and such inequality of expenditure is that which is to be avoided. The treatment of consumption in a hospital is objectionable, again, in regard to exercise. Of what use to the consumptive is an acre or two of airing ground confined at the back of his hospital? Let him be certain that where the gardener cannot make roses bloom, and peach trees blossom, no doctor can give to the anæmic cheek a permanent colour, to a lost function its uses, or to an impoverished body its once healthy power.

A last consideration on the value of muscular exercise is, that it is eminently useful in keeping the respiratory muscles in a state of active nutrition. For, if to the loss of capaciousness in the lungs to receive air, there is added a daily increasing failure in the muscles by which the acts of inspiration and expiration are carried on, it is clear that a double evil is at work. Now this double evil is most actively presented in consumption. As the respiratory muscles, together with the other muscles, lose their tone, so do the general symptoms of exhaustion increase in severity; sometimes without very marked change in the pathological condition of the lungs. As a sequence, day by day, as the nutrition of these muscles decreases, and as they fail in tonic contractile power, they gain in excitability; so that the irregular spasmodic contractions to which they are subjected in the act of coughing are produced by the merest excitement, and the cough is more frequent as it becomes more feeble.

Rule III.—*A uniform climate is an important element in the treatment of Consumptives.* Consumptive patients are constantly asking questions as to the value of a change of climate. The poorest applicants for relief are anxious on

this point, and are often ready at once to contemplate emigration, if the merest hope is given to them that such a course would prove beneficial. Several patients under my care have thus, while in the first stage of the disease, gone away, some to Western Australia, some to the South of Ireland, two to the Cape of Good Hope, and one to Valparaiso. Their fate I do not know. Patients sometimes have friends living in distant parts of the world, to whom they would like to go if such change of climate is recommended. In these cases I look at a map of the district, and obtain some geographical information regarding it before giving an opinion. Mr. Keith Johnston's *Physical Atlas,* and his paper on the "Geographical Distribution of Disease throughout the Globe",* are documents of great value in this respect, since they give the physical characters of each country, and a history of its most prevalent diseases. In considering climate, the fact should be remembered that the main point to be obtained is to select such a part of the earth's surface as presents the nearest approach to an equality of temperature. Different writers of eminence have given the most contrary opinions on climate and consumption. Some have recommended a warm climate, others the polar regions. Both parties have spoken from experience, and they are, in some measure, both right; for a climate equally cold, and a climate equally hot, are each much more favourable than one in which there are constant variations, and where the thermometer in the course of the year dances about from many degrees below freezing point, up to 100° or more. Speaking of the mortality of consumption in 153,098 deaths between the years 1841 and 1851, the Irish Census Commissioners thus observe:—

"As might naturally be expected, the seasons exercised a very marked influence upon the deaths from consumption. During the mild months of autumn, succeeding the warm season of summer, the deaths attributed to consumption amounted to only 23,010; with the cold of winter the mortality from this cause increased, so as to present a return of 38,956; but with the harsh trying weather of spring it rose to 51,334, and in summer fell again to 39,798."†

This statement represents a very important truth. It is certainly best for the patient, if the temperature, while equal, is also temperate; but a mean temperature of 35° on

* For this paper, see JOURNAL OF PUBLIC HEALTH for July 1856.
† Census of Ireland for the year 1851. Report on Tables of Deaths, p. 448.

one side, or 75° on the other, is preferable to one varying constantly, to-day at 60° Fahr., to-morrow at 40°, and a few days later at 80°.

In taking charge of a large number of consumptive patients attending for relief at an institution, it is a remarkable and highly instructive task to observe the influence of climatic changes in the symptoms of the disease. As each day comes for attendance at the Royal Infirmary for Diseases of the Chest, I can predict, almost with absolute certainty, what is the history I am to hear from the consumptives who are coming before me. If for some days there has been an uniformity of temperature, and the weather has been mild and dry, so that an airing each day out of doors has been effected, the visit is quite a cheery one; all seem better; the medicines are said to agree. The cough is less troublesome, the body is warmer, and hope, throwing an inward sunshine, lights up each face with brightness and activity. In frosty days, too, when the air is dry and the temperature continues even, the symptoms are often equally favourable; but during periods, so common in this country in the spring and in the beginning of winter, when the atmospheric variations are sudden, marked, and often repeated in the course of a few weeks, the general aspect of affairs is widely different. I have heard on these occasions almost every patient complaining; the symptoms are all exaggerated, the mind discontented. There is a general request for a change in the medicine. Something is asked for that will soothe, for the nights are passed indifferently. It is useless to comply always with these demands, since the exaggerated train of complaints has a general and common cause; but now and then the modification of symptoms is so great as to call for a modification of treatment.

During these seasons of variation, deaths from consumption are most prevalent. Thus an equable temperature is of great moment, and should always be sought after by the phthisical sufferer. If he cannot remove from his own locality, and if the variations in it are considerable, he must meet them by the best precautions at command. In-doors it is not difficult to sustain a pretty even temperature, varying from 50° to 60° Fahr. Out of doors, something must be done by attention to clothing, and by the use of the respirator. The most marked variations, however, occur in the night, and hence the importance of keeping up an equality of warmth in the bedroom, in the manner already described.

The reasons why consumptives feel the effects of climatic

changes so much, are sufficiently obvious. The effects of such variations are felt, indeed, in the best health; for the body is in some measure both a barometer and a thermometer, at all events it is subject to the same influences, the lungs being in all cases the parts most affected. With the temperature moderately high and the air dry, the physiology of respiration is carried on easily and well. The amount of oxygen taken in is ample, the expiration of water, carbonic acid, and ammonia is free; the pulmonic circuit of the blood is unimpeded; the exhalation of water from the skin is unchecked; and the radiation of heat from the body is moderate. Let the atmospheric condition suddenly change for one in which the temperature is 35°, or less, and in which the air is charged with watery vapour; and the conditions of life are materially modified. The supply of oxygen taken into the lungs is less; the process of absorption of such oxygen by the blood is less; the products expired are less; the pulmonic circulation is impeded; the watery exhalation from the skin is in part suppressed; the radiation of heat from the body is much more rapid; and, as a result of all, the whole man, body and mind, is reduced in force and in vitality. This is the course of things in a healthy man during atmospheric variations. It is left with the reader to trace out the exaggerated evil of these changes in those who, at the most favourable times, are existing with the lungs reduced in capaciousness and the respiratory muscles in power.

I shall recommend no particular place as a resort for consumptives; for I wish not to enter into disputation on this point. But here is the formula for an hypothetical consumptive Atlantis. It should be near the sea coast, and sheltered from northerly winds; the soil should be dry; the drinking water pure; the mean temperature about 60°, with a range of not more than ten or fifteen degrees on either side. It is not easy to fix any degree of humidity; but extremes of dryness or of moisture are alike injurious. It is of importance in selecting a locality that the scenery should be enticing, so that the patient may be the more encouraged to spend his time out of doors in walking or riding exercise, and a town where the residences are isolated and scattered about, and where drainage and cleanliness are attended to, is much preferable to one where the houses are closely packed, however small its population may be.

In speaking thus of the value of an equal climate, I am guided entirely by the facts daily presented to me in relation to climatic variations on patients living in or near

London. Some authors, however, infer from mortality returns, gathered from various quarters of the world, that variations of climate do not materially affect the disease. The following are Mr. Keith Johnston's remarks.

"Tubercular consumption cannot be said to be a disease peculiar to any one portion of the globe, or to be dependent on climate in any appreciable degree, unless it can be shown that it does not prevail in the excessive climates of the north. It originates in all latitudes from the equator, where the mean temperature is 80°, with slight variations, to the higher portion of the temperate zone, where the mean temperature is 40°, with sudden and violent changes. The opinion long entertained, that it is peculiar to cold and humid climates, is founded in error. Far from this being the case, the tables of mortality of the army and navy of this and other countries, as well as those of the civil population, warrant the conclusion that consumption is more prevalent in tropical than in temperate countries. Consumption is rare in the Arctic regions, in Siberia, Iceland, the Faroe islands, the Orkneys, Shetlands, and Hebrides. And in confirmation of the opinion that it decreases with the decrease of temperature, Fuchs shows, from extensive data, that in northern Europe it is most prevalent at the level of the sea, and that it decreases with increase of elevation to a certain point. At Marseilles, on the seaboard, the mortality from this cause is 25 per cent.; at Oldenburg, 80 feet above the sea, it is 30 per cent.; at Hamburg, 48 feet above the sea, it is 23 per cent.; while at Eschwege, 496 feet above the sea, it is only 12; and at Brotterode, 1800 feet above the sea, 0·9 per cent. It is calculated that in the temperate zone, within which nearly all the civilised inhabitants of the globe are located, at least one-tenth of the population die of this malady. It is uniformly more fatal in cities than in the country: in England the excess in cities is equal to 25 per cent."

But the facts here related are not opposed to the rule of climatic uniformity when carefully weighed. On the contrary, they go with the rule; for as consumption is most rare in extreme northern climates, and at great elevations, so in these localities are variations of climate less marked. It remains yet for statistics to show whether in more favoured patches of earth, where with the same absence of climatic variations there is a more genial but temperate warmth, the disease is equally prominent and fatal.

The Reports of the Irish Census Commissioners, already noticed, add, however, more force to the rule I have laid

down, than any facts as yet published. The mortality from consumption in the spring months, for ten years, is there shewn to be twenty-two thousand more than in any other season. Why? Not, it is clear enough, because the months of spring are hotter than those of winter, or colder than those of summer; but because, in this transition season, the variations of climate are more severely felt. It is "the peevish April day" that tells, in its numerous changes, its cold mists, its warm sun, its heavy showers, on the constitution of the consumptive man.

RULE IV.—*The dress of the consumptive patient should be adapted to equalise the temperature of the body.* Instinctive sensations both in health and disease naturally dictate the above rule. But it is too commonly the fact that these sometimes are disobeyed. Some persons think it a hardy, and therefore a beneficial plan to dress lightly in all weathers. Foolish mothers send out their children in midwinter with bare legs and chests; young ladies go to balls and evening parties with the upper part of their dresses open, to show off more effectually a finely chiselled throat and bosom. A lady hints to me that this is the custom of society, not the vanity of the sex. Admitted, madam, out of courtesy; but is society to have its victims from the innocent? It has enough, I take it, if it has them from the wicked only. Others go on a different tack; they must at all seasons be smothered up in flannels and outer dresses, layer upon layer, carrying in short as much cloth as they possibly can, like a fast sailing cutter. Such persons on both sides evidently misunderstand the uses of clothes, or think them only ornamental appendages. But clothes are useful, in a sanitary point of view, simply for equalising temperature, *i. e.*, for preventing more or less the escape of the animal heat as it is radiated from the external surface of the body. Heat is transmitted slowly through flannel, so flannel is warm. For this reason, some say that flannel should be worn in summer as well as in winter, because in winter it retains the animal heat, and in summer it prevents the external heat from oppressing the body. The last part of this argument is a mistake, as experience teaches. For the body does not get its heat from without but from within, and the course of the heat is always from within outwards into space. If, therefore, as occurs in summer, the body cannot barter its heat freely enough to the warm air which surrounds it, it becomes hot; but surely it is no good policy to prevent such radiation as would go on, by interposing a layer of flannel between the

body and the air. A loose flannel outer dress may be passable in hot weather, because the air circulates freely beneath it; but a closely fitting flannel underdress is just as unnecessary in this case, as it is necessary in winter when the air robs the system of more heat than can be conveniently spared.

I speak here of the body in health. In the consumptive patient, the principle is modified. He, from the deficient play of his lungs, is virtually always living in winter; and you shall find him on the hottest days breathing with anxiety, and with his hands and brow cold as marble.

For the consumptive, therefore, flannel clothing is always required, and it should cover the whole of his body. The poorest man or woman may avail themselves of this, for it matters little what the outer garments are if the under ones are non-conductors of heat. The thickness of flannel must vary according to the sensations; as far as is possible, the feeling of absolute cold ought to be at all times prevented. The consumptive should sleep also in flannel; not in the dress worn during the day, but in a flannel gown. The shoes worn should be thick, whole, and comfortable. All sorts of absurdities in the way of hair skins, warm plaisters, and the like, placed specially on the chest, are useless; and the plaister is worse than useless, since it checks the function of the skin over a considerable surface, and is dirty.

A common practice in the selection of clothes is to imagine that the weight of a garment conveys an idea of its warmth-sustaining power. This is an absurd error; for what is warmer than a German coverlet, which is simply a silk bag half filled with down, and nearly as light as air? For the consumptive persons, this mistake about heavy clothing must be carefully avoided; they may safely trust to flannel, and may then walk out as warm as they can be made by clothing, without the risk of being wearied from the burthen on the back before they have got half a mile from home.

There is one modern article of male attire, on which a word of caution must be said, for its bad effects are unmistakeable. I must warn men in general, and consumptive men in particular, against wearing what are called waterproof India rubber coats. That these intolerable nuisances are very tempting there is no doubt; they are light; they are rain-proof; and are they not reversible, two-faced, so that one may be transformed by them, in half a minute, from the similitude of a cabman into the representative of a very spruce gentleman? But let any one walk in one of these portable bathing machines, with the shiny side inwards, for an hour or so, and

at a brisk pace; and, when he has finished his journey, let him look at the shiny side within, and feel the hygrometric state of his under coat; and if he does not find that there is such a thing as getting wet through without rain, and that anything preventing a drenching of the body from without is certain to check the exhalations from the skin, he must be very blind to the defects of the reversible. The healthy man may tolerate one of these garments; the consumptive, never. They load the under clothes with moisture; they give a cold envelope to the surface; they produce chill; and, by checking the cutaneous function, they throw a double amount of work on lungs, already failing under their ordinary duties.

Is it necessary to more than mention those abominations of female attire, corsets? I hope not. However, as some young ladies are still led to imprison themselves in them, it may be well to tell the mothers of such, that to screw up a consumptive child's chest with stays, is only equivalent to preventing the act of breathing by the mouth, because it is performed with difficulty by the nose.

Rule v.—*The hours of rest of the consumptive patient should extend from sunset to sunrise.* If exercise is important to the consumptive patient during the day, a due allowance of sleep is equally necessary during the night. The natural hours of sleep are from sunset to sunrise, and it is the business of the consumptive to make nature his oracle. Shakespeare has happily said that sleep is the "chief nourisher in life's feast", and Menander held that it was "a remedy for every curable disease". The great use of sleep truly is to renovate; for in this state the formative processes go on most actively. Metcalfe, to whom I before referred, has well defined the difference between exercise and sleep, by saying "that during exercise the expenditure of the body exceeds the income; whereas during sleep the income exceeds the expenditure."

It is obvious that to the consumptive man nothing can be more important than that his income should exceed his expenditure; and it is quite remarkable how much alleviated all the symptoms of consumption are when the balmy god is appealed to not in vain. The rule I have laid down regarding the hours for sleep is imperative for many reasons. First, because in all seasons the actual amount of rest required by the natural man is pointed out with the precision of an astronomical law by the course of the sun. In midwinter men require, for physiological reasons, more sleep than they do at midsummer, and just so much more as is indicated by the

difference of night in these two periods. Observe how all animals, left to their own natural instincts, obey this law. Secondly, in our present artificial mode of life, we have to extend the day by the invention of artificial lights. But whenever a man shuts himself up in his closet, and makes a little sun out of his gas lamp or candle, he is feeding that lamp with a part of his own breathing store—the air around him. Worse still, the candle can, no more than the man, live alight without exhaling carbonic acid gas, and thus vitiating the atmosphere. A pound of oil burnt in a lamp produces, in burning, nearly three pounds; and every cubic foot of coal gas, rather more than a cubic foot of carbonic acid. The evil effects of carbonic acid on the lungs have been already described. Thirdly, as an artificial light is, by the mode in which it is produced, of necessity injurious, so, on the contrary, the pure sunlight is of the greatest worth in the acts of vitality. What sunlight does in a physiological way is undetermined; but its general influence has long been known and recognised. Plants banked up from the light become blanched, and human beings kept for a long time in dark abodes become the victims of anæmia and scrofula.

Thus, to fulfil the natural law regulating the times of sleep, to escape from the artificial light, and to obtain the advantage of all the sun-light that can be secured, the consumptive patient should make the sun his fellow workman.

During the act of sleep many physiological modifications occur, which it is important to notice. In the sleeping state the number of respirations are diminished and the circulation is more feeble; as a result, the temperature of the body is reduced. These facts supply two indications, viz., that a free supply of air must be given to the sleeping man, and that he must be well enclosed in woollen material, so as to husband his animal heat. The profuse perspirations, which form so marked a symptom in the phthisical generally, come on during a profound doze, and the patient wakes to find himself bathed in moisture. It always occurs to me, that this profuse action of the skin is but secondary and consequent to a diminished exhalation from the lungs. At all events, after having tried oil inunctions, sponging with acid solution, and the administration of various astringent remedies, with varying success, I have found no plan so efficient for preventing these perspirations as that of supplying a constant current of pure air. This system does not, of course, interfere with the application of other remedial measures, but it should stand foremost. Cough also, so common a

disturber of the night's repose, is most effectually treated on the ventilation principle. For an impure air excites cough by its direct effect on the mucous surface of the air passages; and further, as before shown, when air laden with carbonic acid is inhaled, the chemical changes of respiration are checked, the pulmonic circuit is retarded, the heart becomes embarrassed, and congestion of the lungs is an inevitable result. This is another exciting cause of cough and expectoration.

Rule vi. *The occupation of the consumptive patient should be suspended if it is in-door or sedentary; but a certain amount of out-door occupation may be advantageous.* This rule is one which, in the majority of cases, is most difficult to carry out, though second to none in importance. There is, in a word, no exciting cause of consumption so general as an in-door occupation. I remarked some time ago that about two out of every three patients with consumption, who presented themselves before me at the Infirmary, were found on inquiry to be employed in some in-door business. This was confirmed accurately by reference to the Infirmary books, the figures of which have been very carefully analysed for me by Mr. Pring, a student and assistant at this institution.

Of late, the occupation of every patient applying for relief has been noted down; and since this plan was commenced, there have been at the Infirmary five hundred and fifteen cases of consumption under the treatment either of my colleagues, Drs. Davies and Powell, or under my own care. From the pains that are taken in diagnosis in each of these cases, they may be all received as representing real instances of the disease, in one or other of its stages. Out of these five hundred and fifteen cases then, not less than 68·34 per cent., or rather more than two-thirds, have been persons following in-door occupations. Possibly the per centage is even higher, for all who have called themselves labourers have been presumed to be out-door workers, although this may not have been always the fact, since many labourers in London are employed in vaults, in warehouses, and in gas-works. Among the in-door occupations which present the largest number of cases in this list, boot and shoemakers rank first; needlewomen second; watch and clock-makers third; domestic servants fourth; painters fifth; tailors sixth; printers, of whom the majority are compositors, seventh; bookbinders eighth; French polishers ninth; cigar-makers tenth; writers eleventh; smiths twelfth; tinmen thirteenth; and cabinet-makers fourteenth. There are

altogether in the list one hundred and forty trades specified, but the above named fourteen yield rather more than forty-four and a half per cent. of the whole.

I am aware that five hundred and fifteen cases, however carefully selected, are a small number from which to draw any very large conclusion; and I regret that the table of occupations and diseases given by the Irish Census Commissioners is too general and vague, in its application of terms, to admit of its being used in this place. But of the fact of the great preponderance of consumptive cases amongst persons who live in a confined space, there can be no reasonable doubt.

In the case of parents having children of a consumptive tendency therefore, the greatest care should be taken to obtain for them out-door employment. But here a serious delusion commonly comes into play. If the child is weakly, the fond parent urges, that it is unfit for hard labour and for out-door vicissitudes; so it is sent to a tailor or shoemaker, to a clerk's office, a draper's shop, or to some occupation of an in-door character; by this grand, ignorant, and fatal mistake, it is added to the list of the two-thirds who swell the tables of consumption cases.

In many in-door occupations a double mischief is at work. The patient is confined in an impure air, and is made to inhale some foreign agent, present of necessity from the character of his work, and with which the air is charged. I cannot here enumerate the substances which the lungs are thus made to inhale; they are as various as trades themselves. Sand and glass, in the sand-paper manufactory; dusts and fluffs of different kinds in textile manufactories; acid vapours in dyeing establishments; naphtha and turpentine vapours in polishing and burnishing shops; these are but a few examples.

Whenever a consumptive patient following an in-door occupation comes under treatment, he or she must be made either to leave it or to modify it. Some occupations, such as cigar making, sand-paper making, and fur dying, are absolutely fatal, and it is hopeless to treat medicinally the patient who continues to follow them. But in other trades, where no mechanical mischief is being done to the lungs, and where the evils mainly are those of confinement in a room and want of exercise, very much can be done by ventilation, and by getting the sufferer to give up a portion of every day to a long walk in the open air.

Almost all occupations implying muscular exertion out of

doors, without undue exposure to wet and damp, may often be pursued by the consumptive as long as possible, and with advantage. The pursuit of some occupations is better exercise than simple walking, since it keeps the mind occupied and in healthful tune.

I remember a patient once who, in the first stage of consumption, insisted on coming into town each morning from a considerable distance in the country, to look after his business, and to return home again in the afternoon. It mattered not that the sky looked threatening, for he was not afraid of such a trifle, although he knew that the plague spot was in his breast. When expostulated with by friends (and, I am ashamed to say, by myself, for I was ignorant then of the truths I now preach), his reply was, "My brothers and sisters have all died of consumption; they were coddled up, nursed, carried about, confined to bed, and bound in the cords of helplessness by the kindest hands, to the satisfaction of the doctor and of all concerned. But they soon died. I hold the germs of the same disease, and I too shall die; I know it; but my course is different, for I have made up my mind to die in harness; I have kept at my business in resistance to all entreaties, and I am the only one of the family left." The plan adopted by this man was right; he bore the brunt of the disease for months, and, to the best of my knowledge, he is alive, and occupied still.

I recommend every consumptive, whose occupation is in the open air, to take to heart the motto of this man, to make up their minds "to die in harness". They will live the longer for the resolution.

In these remarks I refer only to bodily labour. It is always well to keep the mind easily occupied, but extensive mental exertion or study is quite inadmissible. It leads to muscular inactivity, to seclusion, to an interference indirectly with respiration, to the more rapid evolution of the disease, to death.

Rule vii.—*Cleanliness of body is a special point in the treatment of consumption.* But little need be said to enforce this rule. In health there is always a mutual understanding and a kind of partnership between the skin and lungs. In consumption moderate action of the skin is a relief to the lungs, and as such ought to be encouraged. This is best attained by keeping the skin clean by daily ablution. Let the consumptive boldly take his bath as each morning comes; not a shower bath, not a cold bath, under any impression that water cast on the body in a certain fashion, or at a cer-

tain temperature, will give strength, but a tepid cleansing bath, with the temperature from five to ten degrees above that of the body. There is no occasion to stay in the bath a moment longer than to obtain a free ablution; then the patient should rapidly but effectually dry himself all over with a rough towel, and dress with the flannel garment undermost. If oil inunction has been used over night, a little liquid ammonia may be added to the bath water, and a soap will then be made on the body during the ablution.

The clothes of the patient should be kept as clean as possible, and the under clothing should, properly, be changed every second or third day.

Rule viii.—*Marriage of consumptive females for the sake of arresting the course of the disease by pregnancy is morally wrong, and physically mischievous.* In all ranks of life, when young females are the victims of consumption, marriage is sometimes looked to as a means for arresting the disease. There is a general feeling that if a consumptive woman become pregnant, the symptoms of the disease will be at least temporarily suspended. I do not dispute this position, for I have, I believe, witnessed the fact many times of a pregnancy checking the progress of consumption. There are physiological reasons why it should do so. As the blood of the mother goes to the support of the child which she bears, it finds, in the placental structure, and in the lungs of the fœtus, favouring structures for the deposition of tubercular matter. Hence, there is a diversion of the disease, in some measure, from the maternal organs.

But it is because the mother is thus saved at the expense of her offspring that the rule given above should be the more urgently insisted on. These innocents, thus made the scapegoats of their parents' infirmities, come into the world only half mortal; they come into the world to pass through all the miseries of a consumptive life, and, if they survive long enough, to add further misery, in many cases, by propagating other specimens of the half mortal series. This is, and must be considered an infringement of a moral law.

But it is physically wrong also; for what if, through a few months, a life be prolonged? What is the result when the period of pregnancy is past? This, and, without paradox, nothing less; that the end is the quicker for the delay. A few weeks, nay, a few days, and the little half mortal, scapegoat *par excellence,* is left to struggle as it can, onwards, upwards, on the treadwheel of its existence, without the maternal care, or the love that breathes dearest on its own.

Meantime, while yet a temporary respite is sought for, the expectant mother is prevented, in great part, from the performance of that active exercise out of doors which we have seen is so essential in the hygienic treatment of consumption. She thus forfeits what may be a permanent advantage, for one which is temporary, and which goes to perpetuate her own vital deficiencies in her own kith and kin.

Rule ix. *The diet of consumptive patients should be ample, and should contain a larger proportion of the respiratory elements of food than is required in health.* The appetite of consumptive patients is very capricious, and daily grows more so if it is not sharpened up by exercise. When the food taken is not applied to the purposes of nutrition, it is better left untasted; for otherwise it lies undigested in the alimentary canal, and sets up a serious train of dyspeptic symptoms, nausea, and diarrhœa. Kind friends often, with the most provoking and mistaken good nature, thrust upon the consumptive relays of the most improper food, because the necessity for nourishment is so obvious. But the fact is that, when the lungs are acting indifferently, digestion cannot go on actively; since, as Arbuthnot well observed, respiration is "the second digestion". Hence the quantity of food taken by the consumptive person should be small at each meal; but the meals may, if the sensations of the patient require it, be more frequent than in health. Animal food is an absolute necessity, and of all animal foods, mutton is the best. Fatty and oily foods, which constitute the respiratory class, should predominate, and fresh butter, with bread, may be taken almost *ad libitum*, so long as it agrees with the stomach. Cream, too, is very excellent, and the northern luxury of curds and cream is well suited to these cases. Milk, whenever it suits, is advisable as a constant beverage, and good cow's milk, new, answers every purpose; at all events there is, as far as I can gather from cases in which I have seen them tried, no such specific virtues in asses' milk and goats' milk as some have supposed. Tea is nutritious, and may be taken in moderation with perfect safety. Fresh vegetable diets should not be omitted; and fruits, especially roasted apples, are always admissible, except in instances where they excite irregular action of the bowels. The Iceland moss has had a great reputation, as have jellies of different kinds, but these often are slow in digestion, and they have no specific value. Alcoholic drinks in moderate quantities should never be denied the consumptive. Good port wine, unadultered ales, and even brandy and water, are useful. Rum and milk

was once a famous remedy, and I believe I have seen it do good, but not uncommonly it gives rise to acidity and flatulency.

In the selection of these various articles of food, the safe plan is to allow the instincts of the patients to guide the practice. These instincts rarely misdirect; but if they are disobeyed, the results are too often disastrous. The one independent rule which should be impressed on the patient by his adviser is that given above, namely, to take in as much of the respiratory foods, especially the fatty and alcoholic foods, as he feels consistent with his desires and with prudence; for as he lives in some measure in a perpetual winter, he, like the Esquimaux, calls the more freely for the supporters of animal combustion. As regards times of eating, let the instinctive feelings again have their way; when hunger calls, let it it be obeyed at whatever season; and when the stomach says "enough", let that order be attended to with equal punctuality.

Rule x.—*The medicinal treatment of consumption should in the main be of the tonic class.* In consumption, the medicines given should be made to assume the characters of food as much as is possible. Cod-liver oil, though used as a medicine, is essentially a food; and in small doses, often repeated (from one to three drachms for a dose), its value is, to my mind, unmistakable. Steel and quinine are invaluable, and, in their way, are also a kind of food. Opium, so absolutely demanded at times to secure rest, has the disadvantage of interfering with nutrition. The four remedies here named, together with gallic acid to meet depressing discharges, supply with me, as a general rule, all the medicinal remedies indicated in uncomplicated cases of pulmonary consumption.

While fully believing in the constitutional origin of consumption, I believe it to be a preventible disorder, and even curable in its early stages; but preventible only, and curable only, by strict attention to hygienic rules. The rules above laid down, however obvious they may seem to professional men, are to the public unknown and unrecognised. For the public expect the remedy in one pill or plaister, and not in a series of instructions tending to bring men to act in obedience with those simple and allwise laws, in which a truly natural state of existence is implied and embodied. If these observations shall tend to impress this important truth on a few minds, they will not have been written in vain.

SANITARY AND SOCIAL SCIENCE.

REPORTS OF CITIES, TOWNS, & DISTRICTS.

REPORT ON THE SANITARY STATE OF THE TOWN OF DUDLEY.

By J. H. HOUGHTON, Esq., M.R.C.S., Officer of Health.

(*Continued from* p. 76.)

But, if the supply in those districts of the parish which are permeated by the company's pipes is so defective, what must be the condition of those two districts—St. John's and St. Andrew's—where there is not any artificial supply whatever? The following facts will suggest an answer to this question.

At a spot in St. Andrew's district where the population is most dense, the turnpike road divides into two, which diverge at an acute angle. At about two hundred or three hundred yards from the angle a street is cut across, which unites the two roads; the whole forming a triangular space, the base of which is from eighty to a hundred yards. On the two sides of this triangle, formed by the divergent roads, one hundred and forty-two houses stand, with the necessary privies, a number of pigsties, and one slaughter-house, one of the occupants being a butcher. From the back of these hundred and forty-two houses, there is a great fall on either side; and the refuse and drainage from the whole of them and their out-buildings gravitates to the centre, where a deep ditch has been dug to receive it, in some parts a yard or a yard and a half deep, and about the same width. This ditch is always filled with black mud, as thick as turtle-soup, which emits a most noisome smell when stirred. A number of small wells are dug along the side of this ditch, at distances varying from two to four feet; and the water from the ditch filters through the soil into them, and is used by many of the inhabitants of the houses for domestic use: and, indeed, so valuable is this water considered, that some of these pits *are bricked, and have lids with lock and key, to prevent the water from being stolen!*

Mrs. S., the wife of a small tradesman, residing in another part of St. Andrew's district, gave me and Mr. Thompson (member of the Local Board, who is engaged with me in endeavouring to remedy this state of things in St. Andrew's) the following account of the mode of obtaining water: "We carry all our clean water in buckets from the reservoir, and

we are obliged to send for it every day; sometimes we send for it three or four times a day. I have often, when younger, carried *forty* buckets of water on my head in one week from the reservoir to my house." The reservoir belongs to the Canal Company, and is more than half a mile (over a very bad road) from that part of the hamlet in which Mrs. S. lives; so that she has often walked over forty miles a week (half of it with a heavy load on her head) in order to obtain this primary necessary of life. Her neighbours are all in the same condition.

There are a few pools in St. Andrew's, and the water from these is generally used for washing the houses. I have often seen two children standing at the pools together, one filling a bucket to carry water away, and the other washing a mop, on which most probably were the fæces of some child; and, on going into the houses whilst they are being washed with water so obtained, the stench is at times almost intolerable.

I have already alluded to the fact that a sub-committee of the Local Board (with Mr. Thompson, the active and intelligent manager of the British Iron Company's Works, near Dudley, for their chairman) is engaged in devising a plan for supplying St. Andrew's with water.

St. John's is a little better off for water than St. Andrew's, but not much. It derives its supply entirely from wells and from rain. The former are not drained by the mines so much as they are in St. Andrew's, in consequence of the hamlet being built on the basaltic rock.

In Dudley, we find a good illustration of the fact that towns built on hill-sides, without a sufficient drainage, are specially liable to the evils arising from bad sanitary arrangements. This is best illustrated in St. John's district, which is almost entirely built on the basaltic rock, which rises to a very great height above the level of the town of Dudley. From its geological formation, its great height, and the precipitancy of its surface, on a *primâ facie* consideration, we should think it must be free from bad sanitary influences. A little reflection, however, will show that this is not, and cannot be the case, whilst it is destitute of efficient drainage. In St. John's, the streets are laid out one above the other, in rows more or less parallel, each street being many feet above the one next below it. From this arrangement, two evils arise: one, that that side of the houses on the upper side is necessarily kept damp by the earth reaching a distance up the walls; the other, and the most important one, is, that the drainage from the upper houses, having no artificial course,

naturally finds its way downwards, forming cesspools as it goes; and in many places, where the houses are built, as is frequently the case, with doors and windows only in front, these cesspools are formed by the houses themselves damming up the refuse.

My attention was first called to this fact, by an inquiry I was called upon to make into the cause of the prevalence of fever in a yard in St. John's district. On inspection, the yard was found to be one where one would least expect fever to be located. It was pleasantly situated, spacious, well paved and drained (as to the surface); the privies were better than usual, and better kept; there were no pigs; the houses were better built, and inhabited by a much more clean and careful class of people than we often find;—in fact, there did not appear to be any localising cause, and yet the place was full of fever. On inspecting the premises surrounding the yard, the cause was soon obvious. The drainage from the houses next above—from the privies (many overflowing) and the pigsties, had gravitated downwards, and formed a large cesspool at the back of the houses on one side of the court, and had flowed round a great part of the other side, thus almost surrounding the place with a pestilential atmosphere. This place is not unique in Dudley.

In consequence of the absence of drainage and plentiful supply of water, the use of water-closets in Dudley is quite the exception; the old privy with the cesspool being the rule, even in many of the best houses. In those parts of the town inhabited by the poor, the state of these places, previous to the formation of the Local Board, was incredible. In one place I found eight houses, with forty-seven inhabitants, with only one privy, and that in such a disgusting condition as to be totally unfit for use. In another, I found fifteen houses, with ninety-one inhabitants, and only two privies, and one of these had been *dedicated to the public*, and had become so foul and offensive, that the inhabitants refused to use it; so that, in fact, the *ninety-one people had only one amongst them.* One tidy-looking man told me that, in the eleven years he had lived in the yard, he had never entered a privy—"he always goes into the fields, which he considers more healthful." Before the "Board" was established, there was not any control over these nuisances; and, though the two cases mentioned are the worst I met with, there were many in the parish nearly as bad. The people have pretty well accommodated themselves to the circumstances under which they have been placed; the result being, that the back streets,

courts, and other eligible places, are constantly found strewed with human excrements. The efficient remedy for this state of things will only be found by the compulsory use of water-closets, when the drainage is completed.

Next comes the "pig nuisance", which in Dudley is one of the most conspicuous of all pestilential nuisances, not only from the filth necessarily attendant upon keeping the animal under any circumstances, but specially from the number kept, and the filthy condition in which they are kept, as must be the case in any place destitute of water and drainage.

Numbers of facts might be adduced to prove the injurious effects of pigs in towns. I quote a few from my report to the Local Board on the progress of the cholera in 1854. On the 9th of October, 1854, three cases suddenly appeared at a place called "Primrose", which is a sort of long street in St. Andrew's district, built quite on an eminence, and in the country. Within fifteen yards of the back door of the house in which these persons lived, were *eight pigsties*, in the most offensive condition possible, and one of them close under the window where the poor creatures were lying. The fluid ordure from the animals escaped, ran about, and lodged in the inequalities of the surface, forming large bog-holes. On the 18th of September, the child of a shopkeeper in the High Street died. Mr. S. D. Fereday, in reporting the case to me, observed, "the sanitary state of the house is bad, *foul pigsties* surrounding it." On the 4th of November, a mother and her daughter were seized, at a place called "Sweet Turf", at about noon; before four the next morning, they were both dead. "At about ten yards from the front door of the house, which had no through ventilation, there are two foul pigsties; a large pit had been dug to catch the drainage from them; this had overflowed, and covered the surface for some fifteen or twenty yards square around it with the liquid pigs' manure." In another case, "a pigsty was under the bedroom window, and three others within two or three yards of the house"; and in another, "a lot of pigsties had been built against the gable end of the house, which in every other respect was placed in a good sanitary condition." Facts like these might be multiplied to a great extent.

Pig-keeping is a favourite "hobby" with the miners and iron-workers; and many pigs are kept in the most crowded and improper places. From the difficulties of keeping them clean at all, from the continued occupation of the owners, and, most of all, from ignorance or non-appreciation of

the evils arising from the pigs, they are generally kept in the dirtiest possible condition; and, even when they are kept clean, they are only kept so by forming a manure-heap by the side of the sty, which, in a sanitary point of view, hardly lessens the evil.

The evil, however, is not at all confined to the working people; wealthy people and shopkeepers contributing their quota to the nuisance. Complaints have been made before the Local Board, by a medical man, who lives in one of the best houses, in the very best part of the town, of the nuisance arising from his neighbour's (an auctioneer and appraiser) pigs. The principal clerk, resident at the Banking House in the High Street, complained of one of his neighbour's pigs. Another surgeon made a similar complaint. And in one case a number of pigs were kept, by a wealthy individual, on a high manure-heap, placed against a wall which formed the back of some houses. The fluid from them had gradually soaked through the walls and ran down the inside of the houses, and positively drained into the oven where the people who lived in the yard had to bake their food.

The above and other facts having been pressed on the Local Board, they resolved to take the matter up. A sub-committee was formed, and accompanied me in an inspection of these and other evils of a similar nature; and so strong was their feeling, that they unanimously agreed to a report recommending the Board to prohibit pig-keeping altogether within the limits of the town; and a motion to this effect was carried at the Board.

The passing of the resolution was the signal for a great storm in the town. A public meeting was held, and resolutions condemning the measure of the Board passed; and a deputation waited upon the Board at its next meeting to present the resolutions. The "vested interests" and "liberty of the subject" were said to be interfered with; and finally, after an ample discussion into the whole matter, the question was referred to the General Board of Health, who decided that the Local Board had no power to enforce the resolution; and so the matter ended. The pig-keepers triumphed; the pigs got a reprieve, and continue to "wallow in their mire", undermining the health, and destroying the comfort and happiness of very many of the people.

At the same time, a similar scene was enacted in Leicester, with a similar result; and it seems that the nuisance can only be dealt with in detail, which is tantamount to saying that it cannot be dealt with at all; for, from various motives, it is

very seldom found that one neighbour will complain of another; and out of numbers of cases, in which I have been requested privately to remove certain pigs, I have found but very few in which complainants were willing to appear in the matter: they would rather submit to the nuisance from the pigs, than to the nuisance of complaining, and so creating ill-feelings. Thus this monster evil remains without a remedy; and it will remain, unless provisions for its abolition are enacted by parliament.

The slaughter-houses have been a source of much disease in Dudley; but since the Board has been established, they have been regulated by judicious bye-laws, and closely inspected, and the evils arising from them have been very much mitigated. Still, it is almost impossible for slaughter-houses to exist in towns, without injury to the health of the people; and it is to be hoped that they will some day be entirely prohibited, and proper accommodation for the purpose provided in suitable situations.

The lodging-houses are all under inspection, and generally speaking are well conducted and cleanly.

The figures before given will show that the proportion of houses to the people is ample to prevent overcrowding; but the distribution is unequal, and in some cases it does exist, and is the cause of disease. During the cholera, cases were observed where no other obvious cause presented itself; and I have frequently seen it cause fevers in various degrees, and have also found the fevers where overcrowding has existed singularly obstinate and difficult to treat. Amongst all sanitary evils, there is none so difficult to deal with as overcrowding; for it is generally caused by circumstances over which the persons subjected to it have no control, and which they cannot alter, and which no law can reach—I mean the pecuniary resources of the people.

Such is a brief view of the sanitary condition of Dudley; and I fear it applies pretty much to the towns of the South Staffordshire Coal Field. The effects of this sanitary state are stamped on the people. Cleanliness, as a general rule, is rare. The occupations of the people are of necessity dirty; and the deficiency of water, and familiarity with local filth arising from deficient drainage, soon obliterate all habits of cleanliness, except in particular cases. I have in many cases watched families, who have come from the agricultural districts to seek employment, with habits of the most scrupulous neatness, gradually sink into those of the greatest inattention to personal and domestic cleanliness, as they admit, from the very impossibility of keeping themselves otherwise.

The Public Health Act has already been applied to some of these towns, and measures are being taken to secure its application to others. It is to be hoped that it will be extended to all; and that thus, in the course of a few years, an improved sanitary condition of its thousands may be attained, and that on this foundation a grand superstructure may be raised—the elevation of the moral, the social, and the religious status of the people.

MISCELLANEA.

A NEW GAS STOVE.

Mr. Goode, of Birmingham, has forwarded to us a description of two new gas-stoves, which he has recently invented. One is intended to act as a cooking-stove, the other as a heating and ventilating stove. In both stoves, the flame and heated air, from a central burner, strike against the bottom of an inner chamber, and communicate their heat to it. In the cooking-stove the food to be cooked is placed in this chamber, and is roasted or heated out of contact with the vitiated air, in which combustion has taken place. In the heating and ventilating stove, a current of pure and warm air is delivered into the apartment, uncontaminated with the foul air from the burner. The air in which combustion has taken place is conducted by a flue from the apartment. Air from the room is introduced into the inner chamber by tubes arranged round the burner. The advantages which Mr. Goode believes to be obtained in this stove are, that the maximum amount of heat is obtained from the burning gas, while the air of the room is maintained in a state of absolute purity.

These stoves are also constructed very cheap, occupy but little space, and supply the heat at a small cost, as far as the consumption of gas is concerned. The stoves certainly rectify many of the faults of ordinary gas-stoves, the admission into the room of air containing the products of the combustion of the gas being very effectually prevented.

PROGRESS OF EPIDEMICS.

LOCAL REPORTS OF EPIDEMIC AND ENDEMIC DISEASES

During the Months of June, July, and August, 1856.

Place.	County.	Lat.	Long.	Observer.
St.Mary, Scilly	Cornwall -	49.50 N.	6.18 W.	J. G. Moyle, Esq.
Teignmouth -	Devonshire -	50.32 N.	3.29 W.	W. C. Lake, Esq.
Canterbury -	Kent - -	51.17 N.	1. 4 E.	G. Rigden, Esq. James Reid, Esq.
Chatham -	Kent - -	51.24 N.	0.14 E.	F. J. Brown, M.D.
Wandsworth -	Surrey - -	51.28 N.	0. 7 W.	G. E. Nicholas, Esq.
Putney - -	Surrey - -	51.28 N.	0. 8 W.	R. H. Whiteman, Esq.
Up. Holloway	Middlesex -	51.32 N.	0.03 E.	W. B. Kesteven, Esq.
Wanstead -	Essex - -	51.32 N.	0. 2 W.	F. Collins, M.D.
Swansea -	Glamorgansh.	51.38 N.	3.50 W.	W. H. Michael, Esq.
Saffron Walden	Essex - -	52. 3 N.	0.12 E.	H. Stear, Esq.
Bedford - -	Bedfordshire -	52. 8 N.	0.51 W.	T. H. Barker, M.D.
Sharnbrook -	Bedfordshire -	52.12 N.	0.40 W.	R. S. Stedman, Esq.
Newpt.Pagnell	Buckinghams.	52.10 N.	0.42 W.	G. O. Rogers, Esq.
Wellingbro' -	Northamptons.	52.20 N.	0.40 W.	B. Dulley, Esq.
Beccles - -	Suffolk - -	52.25 N.	1.48 E.	W. E. Crowfoot, Esq.
Thetford -	Norfolk - -	52.26 N.	0.45 E.	H. W. Bailey, Esq.
Dudley - -	Staffordshire -	52.30 N.	2.10 W.	J. H. Houghton, Esq.
Barrowden -	Rutland -	52.34 N.	0.38 W.	H. J. Swann, Esq.
Wisbeach -	Cambridgesh.	52.39 N.	0. 5 E.	W. H. Hole, Esq.
East Dereham	Norfolk - -	52.40 N.	0.57 E.	J. Vincent, M.D.
Pontesbury -	Shropshire -	52.43 N.	2.50 W.	Wm. Eddowes, Esq.
Nottingham -	Nottinghamsh.	52.50 N.	1.10 W.	T. Robertson, M.D.
Burton-on-Trt.	Staffordshire -	52.53 N.	1.53 W.	S. Thomson, M.D.
Wrexham -	Denbighshire -	53. 2 N.	3. 1 W.	E. Williams, M.D.
Hawarden -	Flintshire -	53.11 N.	3. 2 W.	T. Moffat, M.D.
Lincoln -	Lincolnshire -	53.12 N.	0. 5 W.	S. Lowe, Esq.
Alford - -	Lincolnshire -	53.15 N.	0. 6 E.	R. U. West, M.D.
Staveley -	Derbyshire -	53.15 N.	1.20 W.	G. B. Thorpe, Esq.
Gainsborough	Lincolnshire -	53.23 N.	0.47 W.	D. Mackinder, M.D.
Liverpool -	Lancashire -	53.24 N.	2.59 W.	Thos. Bickerton, Esq.
Warrington -	Lancashire -	53.25 N.	2.32 W.	C. N. Spinks, Esq.
Wigan - -	Lancashire -	53.32 N.	2.33 W.	W. I. Cox, Esq.
Bolton - -	Lancashire -	53.35 N.	2.19 W.	W. H. Pendlebury, Esq.
York - -	Yorkshire -	53.58 N.	1. 3 W.	W. Procter, Esq.
Wst. Auckland	Durham -	54.45 N.	1.40 W.	G. Todd, Esq.
Rothbury -	Northumberld.	55.25 N.	1.50 W.	E. C. Summers, Esq.

QUARTERLY STATEMENT—No. VII.

[*The dates denote that the disease appeared in the weeks then ending.*]

SCARLET FEVER.

Canterbury..June 6-20, Aug. 22
Chatham..June 6, 13, 27, all July, Aug. 8-22
Wandsworth..July 4
Upper Holloway..August 29
Swansea..June 20, July 4, 18, 25, Aug. 8, 22, 29
Saffron Walden..Every week
Sharnbrook..All June, July 18, Aug. 1-15
Newport Pagnell..June 6-13
Wellingborough..All June, July 4-18, Aug. 29
Beccles..June 6
Thetford..June 13, 27, July 4, 11, 25, Aug. 15-29
Dudley..All July
East Dereham..June 20, all July & Aug.

Wisbeach..All July
Pontesbury..July 11-25, Aug. 1-8
Nottingham..July 4, 25
Wrexham..June 6-20
Gainsborough..August 8
Liverpool..Every week [1-15
Warrington..June 13-27, July 25, Aug.
Bolton-le-Moors..All June, July 4, 18, August 8, 29

MEASLES.

Canterbury..June 6-13, July 25
Chatham..June 13, July 4-11, Aug. 15
Wandsworth..All July, Aug. 1, 8, 22
Putney..August 8-15
Upper Holloway..June 6-13
Swansea..July 18, August 8
Bedford..July 18-25, all August
Sharnbrook..All June and July
Newport Pagnell..June 6, July 18-25, August 1
Wellingborough..All June and July
Thetford..June 6, 13, 27, July 4, 18, 25, August 8, 22
Barrowden..July 11-25, all August
Wisbeach..July 11-18, August 22-29
Pontesbury..July 25, August 1, 8, 29
Hawarden..July 4
Gainsborough..August 8-15
Liverpool..Every week
Wigan..All June [25, Aug. 8
Bolton-le-Moors..All June, July 4, 11,

SMALL-POX.

Canterbury..June 6-13, July 18-25,
Chatham..June 6-13, Aug. 22 [Aug. 8
Wandsworth..All June and July, Aug.
Bedford..July 11 [1, 8
Wellingborough..Every week
Dudley..July 25, August 8-29
Pontesbury..July 4, 11
Liverpool..Every week
York..June 6, 13, 27, July 18-25, Aug. 1
West Auckland..All June

HOOPING COUGH.

Teignmouth..All June, July 4, 11, 25
Canterbury..Every week
Chatham..June 6
Wandsworth..June 27, July 4, Aug. 1-8
Upper Holloway..June 6
Saffron Walden..Every week
Bedford..August 15-22
Thetford..All June and July, Aug. 15,
Wisbeach..All June, July 4 [29
Pontesbury..July 18-25, Aug. 1-8
Burton-on-Trent..July 11, 25
Alford..Every week
Liverpool..Every week
Warrington..August 15-29
Wigan..June 13-27, all July, Aug. 1
Bolton-le-Moors..June 13-20, July 11-25, August 15
York..June 13-27, July 4, 11, 25, Aug. 8
Rothbury..June 13-27

CROUP.

Canterbury..June 27, July 4, Aug. 29
Swansea..June 13, 27, July 11, 25, August 1, 29
Wellingborough..June 6, August 29
Beccles..June 6-20, July 18-25
Barrowden..June 1
Burton-on-Trent..July 11
Wrexham..August 22
Liverpool..June 27, July 11, Aug. 1 22
Wigan..All June
York..June 27, August 29

CATARRH.

Scilly Islands..June 6-20 [Aug. 8-29
Teignmouth..June 13-27, July 11-18,
Chatham..All June, July 11, Aug. 1-15
Wandsworth..August 1, 29
Putney..June 13-20, July 18
Upper Holloway..June 6-13, Aug. 8
Wanstead..June 6-13
Sharnbrook..August 15-29
Newport Pagnell..August 22 [1, 15
Beccles..June 20-27, July 4, 18, Aug.
Thetford..June 6, 13, 27, July 11, 25,
Barrowden..July 11 [Aug. 8 15
Wisbeach..Every week except Aug. 1
Burton-on-Trent..July 4
Gainsborough..All June
Liverpool..Every week
Bolton-le-Moors..July 18-25, Aug. 1-8
Rothbury..July 4-18

INFLUENZA.

Scilly Islands..All July
Teignmouth..June 13-20, July 4-11
Chatham..August 15
Wandsworth..June 6
Upper Holloway..August 8-15
Wanstead..June 27, July 4
Swansea..August 1, 15, 22
Newport Pagnell..All June, July 4, 18, 25, August 1, 15
Wellingborough..June 6-13
Beccles..All June
Thetford..All June, July 4-11, Aug. 8,
Wrexham..June 20-27 [22, 29
Alford..June 20-27
Bolton-le-Moors..July 11, 25, Aug. 1, 15

ERYSIPELAS.

Scilly Islands..August 8, 22
Teignmouth..August 22
Canterbury..June 6-13, Aug. 8-22
Chatham..June 6-20, July 4, 18, 25, August 22-29
Wandsworth..June 13, July 4-11, Aug.
Putney..August 8-22 [15
Upper Holloway..August 29
Wanstead..July 4, 11, 25, Aug. 1
Swansea..June 13-27

Saffron Walden..June 6, 20, 27
Bedford..August 1, 22
Sharnbrook..July 4, August 15
Newport Pagnell..June 6, 20, 27, July 4-11, August 1, 29
Wellingborough..July 25, all August
Thetford..June 13, 27, July 11-25, August 1, 22
Dudley..July 11-18, Aug. 8, 22, 29
Barrowden..June 20
East Dereham..August 29
Wisbeach..August 29
Pontesbury..August 8
Nottingham..June 13
Burton-on-Trent..June 20, July 11, [Aug. 22
Wrexham..August 1-8
Alford..July 4
Liverpool..June 13, July 4-11, Aug. 8, [22, 29
Warrington..August 1-8
Bolton-le-Moors..June 20-27, August 1, 8, 22

CHOLERA.

Chatham..July 11, August 1, 8, 22
Swansea..Aug. 1, 15 (Infantile ch.)
Newport Pagnell..August 1-8
Burton on-Trent..August 29
Wrexham..Aug. 15-29 (English ch.)
Warrington..August 15
Bolton-le-Moors..June 27, July 18-25, [Aug. 8-22

AGUE.

Canterbury..June 13-27, Aug. 8-29
Chatham..Every week except July 25
Putney..August 1
Swansea..August 25
Bedford..June 6-20, July 11, Aug. 29
Sharnbrook..June 20-27, August 4
Newport Pagnell..June 27, July 18
Wellingborough..June 13 to July 18
Thetford..June 13, July 4
East Dereham..July 25, Aug. 1-8
Wisbeach..All June & July, Aug. 22-29
Alford..June 20, July 25 to Aug. 22
Gainsborough..July 18-25
Liverpool..August 22-29
Warrington..July 18

REMITTENT FEVER.

Teignmouth..June 6, 20, 27, July 11-[25, Aug. 15
Canterbury..July 11
Wandsworth..July 18, August 1
Putney..June 6, 13, 27, July 4, Aug. 8, [29
Upper Holloway..July 11-18
Wanstead..August 29
Swansea..July 18, August 8
Saffron Walden..June 6
Newport Pagnell..June 13
Beccles..June 6, 20, August 1-15
Thetford. July 11-18
Wisbeach..June 6-13, July 25 to Aug. [22
Burton-on-Trent..July 4, 18
Hawarden..August 8-22
Gainsborough..June 27, July 4
Liverpool..All August
Warrington..Aug. 8
Bolton-le-Moors..June 13, 27, July 4, [Aug. 1-8

DIARRHŒA.

Scilly Islands..June 6, 20, Aug. 8, 22, 29
Teignmouth..June 6-20, July 18 to [Aug. 29
Canterbury..Every week
Chatham..Every week
Wandsworth..All July and August
Putney..Every week except June 6
Upper Holloway..June 6-13, July 25 to [Aug. 29
Wanstead..Every week
Swansea..Every week [Aug.
Saffron Walden..June 6-13, July 11, all
Bedford..Every week except June 27
Sharnbrook..June 20 to August 29
Newport Pagnell..Every week except
Wellingborough..June 6-13 [June 13
Beccles..July 11, August 15-29
Thetford..June 6, 20, 27, all July, Aug. 8, 15, 29
Dudley..Every week except June 6
Barrowden..June 27 to July 18
East Dereham..August 8-29
Wisbeach..June 6, 20, 27, July 18 to August 29
Pontesbury..July 18 to Aug. 29
Nottingham..August 1 to 29
Burton-on Trent..All June, July 25 to August 29
Wrexham..June 13-20, July 25 to Aug. [29
Hawarden..Every week except June 6
Alford..August 15-29
Gainsborough..June 27, July 4, 25 to [Aug. 29
Liverpool..Every week
Warrington..July 11 to August 29
Wigan..August 8-29
Bolton-le-Moors..June 27, July 4, 18 to August 22
York..June 13, 27, July 4-18, Aug. 8-29
Rothbury..July 11

DYSENTERY.

Chatham..June 13, August 22-29
Wandsworth..July 11, August 15
Upper Holloway..August 29
Wanstead..July 4
Swansea..July 11, 25
Newport Pagnell..June 20-27, July 4-[11, Aug. 1-8
East Dereham..Aug. 8-29
Wisbeach..August 22-29
Wrexham..June 27, July 4
Gainsborough..August 22-29
Liverpool..June 20, July 11-18, all Aug.
Bolton-le-Moors..July 4, 18, 25, Aug. [1-8
York..August 8, 22, 29

TYPHUS.

Teignmouth..August 15-22
Canterbury..Every week
Chatham. June 13, August 8-29

Wandsworth..June 6-20, July 18, Aug.
Putney..July 25, Aug. 1 [1, 8, 29
Bedford..July 18, August 8-29
Wellingborough..August 29
Thetford..June 6, 20, July 18, Aug. 22
Dudley..Every week except Aug. 29
East Dereham..August 22-29
Lincoln..August 1-22
Gainsborough..Every week
Liverpool..Every week
Wigan..August 8-29
Bolton-le-Moors..June 6-20, July 11, 25, August 1

PUERPERAL FEVER.

Beccles..July 11
Alford..June 27, August 1
West Auckland..June 6-20, Aug. 1 22

CARBUNCLE.

Teignmouth..June 20 [15-29
Canterbury..June 6-13, July 4, 18, Aug.
Chatham..August 1
Wandsworth..June 13, August 29
Wanstead..July 4
Saffron Walden..June 20, August 8
Sharnbrook..July 4
Newport Pagnell..June 20, Aug. 8-22
Beccles..July 4-18
Thetford..June 20, July 25
Barrowden..July 11
East Dereham..July 4-11
Burton-on-Trent..June 20
Wrexham..June 13
Liverpool..August 22-29
Wigan..July 4-18, August 1, 15
Bolton-le-Moors..July 11

MUMPS.

Canterbury..August 22
Wanstead..Every week

TYPHOID FEVER.

Swansea..August 8

ADDITIONAL OBSERVATIONS.

St. Mary's, Scilly.—Mr. Moyle says: "Cases of catarrh, influenza, and pneumonia, were the most prevalent this quarter; latterly diarrhœa. I treated eighty cases of influenza in one week. There were no deaths in June, but seven occurred in July, in a population of 2,600; four from pneumonia, one from chronic bronchitis, one from disease of the mesenteric glands, and one (a child) from congestion of the brain. In August there were two deaths (an idiot and a child) from pneumonia. No disease has been prevalent among the cattle. We have had the usual amount of potato blight. The winds have been principally west, south-west, and north-west. The heat has been very great for Scilly in July and August, the temperature of 82° Fahr. being frequently attained; the mean summer temperature is 58°. There was scarcely any rain in June and July; in August there some heavy showers, the fall amounting in two days to 2·68 inches."

Teignmouth.—Mr. Lake writes: "The first eleven days of June were fine and pleasant, and were followed by a fortnight of colder and uncertain weather. From June 25th to July 9th there were a succession of warm and cool periods, each of a few days duration. From July 10th to 29th the weather was on the whole warm and close; the highest temperature for the season, 79·6°, occurred on the 19th. July 30th commenced a hot and brilliant week (five days being absolutely cloudless throughout), the barometric pressure

varying in it from 30·258 to 29·970, the highest maximum temperature being 77·6, the mean maximum, 74·5, the mean minimum temperature 57·9, the mean humidity 68, mean ozone 1·6, the wind easterly. After three cooler days there followed another week of hot weather; in this the barometric pressure varied from 29.961 to 29·690, the highest maximum temperature was 79·1, the mean maximum temperature 75·7, the mean minimum temperature 60·4, the mean humidity 79, mean ozone 4·3; the wind chiefly from the S.W. and S., the sky clouded, and on two days showers of rain. After this the temperature fell somewhat considerably, and the weather was cooler and moister till the end of the month, the temperature rising again towards its close. The rain fall from May 30th to August 15th amounted only to 1·629 inch. Besides the epidemics mentioned in the reports, cases of chicken-pox continued to occur, and there were not a few of rheumatic fever, though not severe in character. During the hot weather roseola made its appearance, and there was a general prevalence of a sore and inflamed state of the gums and mouth. The diarrhœa of August and the latter end of July was generally accompanied with vomiting, and with a good deal of pain and soreness in the upper part of the belly, with some bilious suffusion of the skin, a furred tongue, and a tendency to a febrile condition, the motions being watery and dark-coloured."

ERRATUM. In the report for Teignmouth in the last number of the JOURNAL OF PUBLIC HEALTH, p. 179, line 18 from the bottom, for "pleurisy", read "influenza".

Canterbury.—Mr. Rigden says: "During the past three months hooping-cough has continued to prevail in this city and neighbourhood. Diarrhœa has been prevalent during August. In the early part of June there were a few cases of scarlet fever, and a single case occurred in the third week in August. Only one case of measles and one of small-pox have come under my observation during this period. Fever of a typhous or typhoid character is seldom absent from this neighbourhood. Carbuncles continue to present themselves. The bills of mortality for this city show that deaths occurred in June from fever and croup; in July from fever, croup, hooping-cough, thrush, and diarrhœa; in August from fever and diarrhœa."

Mr. Reid furnishes the subjoined returns, drawn up by eight observers for the Epidemiological Committee of the East Kent and Canterbury Medical Society.

"*Abstract of Meteorological Observations for the Summer Quarter*, 1856.

	June.	*July.*	*August.*
	Deg.	Deg.	Deg.
Highest temperature in the day time....	78	77	77
Lowest..............................	50	52	55
Mean	62·36	63	65·322
Highest temperature in the night	60	64	64
Lowest..............................	45	42	48
Mean	52·26	54·019	57·12
Highest reading of the barometer	30·18	30·14	30·10
Lowest..............................	29·48	29·42	29·31
Mean	29·580	29·878	29·801
Number of days on which rain fell......	11	14	13
Amount of rain in inches..............	1·43	2·39	2·47*

Direction of the wind (the number indicates the number of days the wind prevailed)..*June*—N. 3, NE. 5, SE. 1, S. 1, SW. 14, W. 1, NW. 5; *July*—N. 1, NE. 4, SE. 2, S. 2, SW. 13, W. 4, NW. 3 (only twenty-nine days observation); *August*—N. 3, NE. 4, E. 4, SE. 1, S. 2, SW. 13, W. 3, NW. 1.

"June. There were some sudden and considerable variations of weather observed during this month; the change from hot, close summer weather to a chilly temperature, produced by north-east wind, was much felt, and produced much general illness. Frosts were occasionally noticed at night. The days on which the greatest fall of rain occurred were the 1st, 14th, 16th, 19th, 20th, and 21st.

"July. Slight frost was observed on one or two nights this month; much storm rain fell during the month, and during the latter half there were several thunderstorms. The days of the greatest fall of rain were the 8th, 9th, 13th, 15th, 16th, 17th, 22nd, and 26th. On the 15th, between 12 A.M. and 2.45 P.M., 1·12 inch fell. From the fulness of the river, the valley became sodden during the heavy rains, and much damp generated in the lower part of the city.

"August. The heat during the latter part of July and the commencement of this month was very oppressive; the backward cereal crops were rapidly advanced by it. Frequent thunderstorms occurred; in the second week of the month there were four, accompanied by considerable fall of rain. The days of the greatest fall of rain were the 12th, 14th, 15th, 16th,* 17th, 19th, 20th, and 23rd. The rain much impeded the gathering of the harvest, and did some injury to the corn that was cut at the time.

"With two exceptions, the summer fruits were deficient,

---

* Two severe thunderstorms passed over the city during the night of the 16th, and a great body of rain fell, overflowing the rain-gauge; so that the rain could not be fully measured. The river was so swollen as to threaten a flood in the valley.

and there is a prospect of the autumnal fruits being scarce. The potato disease appeared rather earlier than last year, and was first noticed about the 18th.

Abstract of the Returns of Zymotic Diseases during the Summer Quarter.

"The number of cases, exclusive of diarrhœa, which have been returned by the eight observers during the summer quarter has been 70, being 96 less than the number reported during the spring quarter. This diminution, perhaps, is principally due to the subsidence of measles and small-pox, which chiefly prevailed in the early part of the year. The greatest number of cases was returned for the south-west or upper part of the valley district of the city; the next for the north-west or lower valley district; and the smallest for the east or higher district. The mortality in the whole number returned was at the rate of 10 per cent., and was occasioned by fever, hooping-cough, and croup.

"Small-pox has not yet left the city, and has supplied five cases during the quarter. In one instance it attacked a male, aged 33, who had three evident cicatrices of vaccination; it took a modified course. The four others who were attacked were members of one family who were unvaccinated; the disease presented the discrete form. The last case occurred in the beginning of August.

"Measles, which were shown to be gradually declining in each result of the spring quarter, appears to have ceased about the middle of July; only three cases have been returned during the period.

"Scarlatina is still present; eight cases have been noticed; six during June, and two during August. The cases all appear to have been mild. One child had anasarca of the ankles and face without albuminuria. No fatal case was reported.

"Continued fever shows a higher return this quarter; 19 cases have been returned; many cases of febricula were also noticed, but no report was made of them. The principal complications seem to have been head affection and diarrhœa. There were four fatal cases; three following head symptoms, and one diarrhœa.

"Ague. Seven cases of this disease were observed in June and August, presenting the three principal types; the tertian, however, predominated.

"Hooping-cough furnished eight cases, two of which were fatal from affection of the lungs. In one of those that recovered, croupy breathing was noticed for three days; and in another case there was slight pneumonia. The worst cases

only come under observation, but the disease was reported as prevalent during June and July.

"Erysipelas. Eight cases of this disease were observed, being principally idiopathic, and of the head and face. No fatal case is mentioned.

"Mumps. An instance of this disease is noticed in August, but has not been observed before during the year.

"Diarrhœa, which was noticed in the last report as commencing in the latter part of the spring quarter, continued to be reported as prevailing during June and July, and during August a return of 53 of the severer cases was made by some of the observers. During the last month it has been the predominant epidemic, and is mentioned as such by all the observers. About 300 cases were treated at the hospital during August. One case, in a male of three years, is mentioned, as having fever with cerebral effusion supervening; a child of thirteen months had convulsions; another, four months old, six days after being attacked, had slight collapse; in another instance, it is mentioned that a twin sister had died in the same house without medical attendance. Beyond these, there is nothing to show that any of the cases had a choleraic type. It should be observed that fever and diarrhœa were noticed during every week of the quarter."

Chatham.—Dr. Brown writes: "In the middle of July two cases of serous cholera appeared. There were no more cases until the week ending 1st August, when there were a few mild cases. The following week there were some of the same description. On the 18th August there was an outburst of several severe cases. One house in the parish of St. Margaret's was particularly visited. A child of four years of age died, and the mother barely escaped with her life. The third case in the family was one of frequent vomiting, not amounting to cholera according to the ordinary meaning attached to the term. The child that died survived only twenty-one hours and a half. The weather on the 17th was unusual, there being a violent thunderstorm. The house that suffered so much was in a bad sanitary condition."

Wandsworth.—Mr. Nicholas writes: "Small-pox, which had prevailed to a great extent throughout the district since February, was gradually subsiding in July, when measles supervened; both diseases ceased at the beginning of August.

"During the months of July and August the prevalence of diarrhœa and of disease in general was much below the average; but in the week ending August 16th, a suddenly

increased accession of that epidemic occurred. During that week there were no indications of the presence of ozone. During the last month the potato disease has been very destructive. Cattle have had entire immunity from epidemic disease."

Putney.—Mr. Whiteman states that "The quarter ending 29th August has been remarkably free from disease of the zymotic class. Diarrhœa of a mild form has prevailed more or less since the early part of June, and has increased within the last fortnight."

Upper Holloway.—The cases of remittent occurred in two children who had been resident a fortnight in the month of May at Erith, close upon Plumstead Marshes.

Wanstead.—Dr. Collins states that parotitis has prevailed throughout the quarter. Diarrhœa, though prevalent, is less severe and less general than usual.

Saffron Walden.—Mr. Stear says: "Scarlet fever has been the most important epidemic this quarter, and several fatal cases have occurred in the neighbourhood. Hooping-cough has also been prevalent, but the children have generally had it mildly. I have had several cases of diarrhœa during the past month. The harvest is being rapidly got up; the crops are good. The weather during the past quarter has been for the most part dry and hot; during the early part of August a good deal of rain fell."

Beccles.—Mr. Crowfoot writes: "The only prevalent epidemics with us during the last three months have been neuralgic affections and a severe form of diphtherite affecting primarily the mucous membrane of the pharynx, and in many instances extending to the larynx; the case of puerperal fever was an isolated one to which I was called in consultation, and which terminated fatally."

Thetford.—Mr. Bailey writes: "In this quarter, scarlatina, measles, and hooping-cough have been epidemic in the neighbouring villages, scarcely a family escaping the infection. Some cases of scarlatina have been very severe, assuming the type of scarlatina anginosa, requiring very active treatment, and great attention. In children dropsical effusions supervened, with swollen submaxillary glands. In our district no fatal case has been recorded. The temperature of June was exceedingly fluctuating; the mornings and evenings were cold, and the middle of the day very hot. The atmospheric pressure was variable. The prevailing winds

were south-west, with only half an inch of rain during the month. This state of weather gave rise to several cases of catarrhal affections — influenza, and, with children, bronchitic disease, which terminated fatally in five cases. Amongst the labouring poor pleurisy was unusually prevalent, and also typhoid fever, of which one case proved fatal. Throughout the month erysipelas occurred in four instances. I cannot ascertain any communication with those affected with the disease. I consider it more epidemic than contagious. But few cases of diarrhœa occurred in June, and those only in the last week of the month, when the temperature rose to 90°—the highest during the summer in this locality. Rheumatism is a disease of both summer and winter, and may be attributed to imprudent exposure, to which the working classes often subject themselves. Several cases of cynanche tonsillaris came under treatment, arising from the same atmospheric cause.

"During July the atmospheric pressure was remarkably steady, except on the seventh and eighth days, and the temperature a summer one, the prevailing winds south-west, and the quantity of rain less than usual, being only 1·25 inch for the month. Diarrhœa was more prevalent, especially in children, which may probably be, in some measure, attributed to fruit; but with adults this was not the sole cause; the continued heat, with chilly evenings, more probably gave rise to the complaint. Only one case of typhoid fever came under medical observation in this month; the disease was cut short by large doses of quinine. Rheumatism and erysipelas still continued under treatment, and fresh cases were occurring. Influenza in an elderly person proved fatal. Two cases of remittent fever occurred in labourers, arising from being wet many hours during their work; in one of whom a large carbuncle formed in the neck. The casual diseases under notice were paralysis, gastralgia, menorrhagia, gout, and some cutaneous diseases.

"For several years we have not experienced so hot a summer as in part of July and the first fortnight of August, the temperature averaging 78°. The prevailing winds were north-east half the month, and south-west the other half. The rain amounted to only 0·75 inch. Scarlatina, measles, and hooping-cough still prevail around us in August, attacking adults as well as children. In several of the latter dropsical effusions, with swollen glands occurred, being produced by too early exposure. However, there was no fatal case in the whole district. On the 18th of August a considerable

reduction of temperature took place, and continued to the end, averaging as low as 63°. This vicissitude gave rise to many cases of bronchitic affections among children, and influenza and catarrhal affections in adults, also to some severe attacks of asthma in those predisposed to the disease. Erysipelas was still epidemic, attacking the face, head, and the epigastric region, producing much constitutional derangement. Diarrhœa was not so prevalent as in July; but rheumatism was more frequent with the working classes. During the excessive heat the harvest men were suddenly attacked with violent spasmodic pains and cramps in the stomach and bowels, evidently arising from drinking cold water or small beer while in a state of great perspiration. Large doses of opium with aromatics speedily relieved them; but the prostration left prevented them from resuming their work for some days. The casual diseases of the month were leucorrhœa, hysteria, hepatitis, laryngeal consumption, abortion, placenta prævia, fracture, hæmorrhoids, hernia humoralis, gonorrhœa, headache, tic douloureux, and neuroses.

"Pneumonia and enteritis have been the prevailing diseases among the cattle, and also the strangles. From the abundance of food, the sheep are more healthy, but great mortality previously existed from the murrain. There has been a great failure of fruit, especially apples; and the leaves indicate an early autumn."

Record of Deaths in Twenty-one Parishes (population 9,574) from the Registrar's Book.

June.		*July.*		*August.*	
Diseased heart	2	Bronchitis	3	Paralysis	1
Atrophy	3	Atrophy	1	Hooping cough	1
Inflammation of brain	1	Debility	2	Decay of nature	1
Consumption	6	Cephalitis	1	Consumption	3
Premature birth	1	Decay of nature	2	Mesenteric disease..	1
Debility	2	Diseased heart	1	Diseased heart	1
Convulsions	1	Consumption	3	Hydrocephalus	1
Drowned	1	Hooping cough	1	Congestion of brain	1
Natural decay......	1	Dropsy............	1		
Fever	1				
	19		15		10

Dudley.—Mr. Houghton writes: "Dudley has been remarkably free from zymotic diseases during the last thirteen weeks. Cases of fever and diarrhœa have occurred in each week of the quarter, but they have not been numerous or severe. Inflammations, of a phlegmonous character, have been prevalent, chiefly attacking the hand and fingers, and requiring free and early incisions. The cases of erysipelas have assumed the same type. In two cases it was associated

with albuminous urine, with fatty casts in the one case, and granular casts in the other. The former was fatal; the latter recovered partially, after having had convulsions and paralysis. Pleuropneumonia has attacked horses, and influenza cattle generally; glanders have been prevalent."

Barrowden.—Mr. Swann states that, in the Barrowden district, consisting of thirteen parishes, diarrhœa was very prevalent during the latter part of June and beginning of July, for two or three weeks. During the last five weeks measles had been spreading rapidly through North Luffenham; but no deaths had occurred.

Burton-on-Trent.—Dr. Thomson says: "Diarrhœa was more prevalent than usual about the middle of June. On the 28th of June a case of remittent fever, traceable, I believe, to a few days residence close to where the cleanings of large pool had been placed. The weather was at the time extremely hot. On August 23rd I was called about 9 P.M. to a man, aged 30, who had been seized with choleraic symptoms. During the day, from 9 A.M., rice water purging had been going on to a large extent, with frequent vomiting; at 3 P.M. cramps came on in the extremities. When he was visited, the purging and cramps still continued, the surface was cold and blue, the extremities of the fingers shrivelled, the tongue cold, the voice suppressed, the pulse scarcely perceptible; the whole appearance being one of intense collapse. The urine was completely suppressed for thirty-six hours. Under proper treatment the man recovered.

"This was a case of aggravated British cholera, which it would be extremely difficult to distinguish from a somewhat severe form of the Asiatic disease. In the case in question, there was very copious rice water or gruel purging going on for some hours, accompanied with sickness; in a few hours cramps set in, the surface became cold and blue, the fingers shrivelled, the tongue cold, the voice much reduced in power and altered in pitch, pulse almost imperceptible, thirst intense: and there was suppression of urine for thirty-six hours. There was no sweating and no consecutive fever; the disease at once yielding to a mixture composed of chloroform and liquor opii in strong doses, given in conjunction with pills of gallic acid, and aided by a very efficient vapour bath.*

* I take this opportunity of noticing the "very efficient vapour-bath", which I am now constantly in the habit of using, both on account of its efficiency,

"The village in which this case occurred is very badly drained, a large open ditch or sewer running close to the man's house. Moreover, for some days previously, a more than usual amount of bilious cholera had prevailed among his neighbours, and his own child had been severely affected. It appears to me that the absence of consecutive fever strongly marks the difference between the more specific simple British cholera, that is, a non-malignant disease, commencing, or at least distinctly marking its commencement in the chylopoietic viscera, and the specific malignant Asiatic disease commencing, probably, in the nervous system, and precipitating, as it were, in most instances, but not in all, its influence upon the alimentary tract. The one simple disease, the other as essentially specific as either typhus or typhoid fever."

Lincoln.—Mr. Lowe writes: "This district has been more than usually free from epidemic and endemic diseases during the past quarter. A few cases of typhus fever, occurring in some newly built houses, in a low situation, are all I have had to note."

Stavely.—Mr. Thorpe says: "There has not been an epidemic of any description the last quarter; in fact, the neighbourhood generally is in a much healthier condition than I have known it for the sixteen years I have resided here. This I attribute, in a great measure, to the attention paid to draining and sewerage."

Gainsborough.—Dr. Mackinder writes: "Notwithstanding the great fluctuations in the weather, Gainsborough has been exceedingly healthy during the past quarter. Diarrhœa and English cholera have been much less frequent than usual at this season, owing, perhaps, to the great scarcity of fruit. In August, as observed by Mr. Dyson,

---

and of its convenience, especially in the houses of the poor, where really good means of applying general heat are so completely wanting. The method may be familiar to some; but to others it may be, as it was to myself, a welcome addition to my ways and means. Three or four new porous bricks are to be boiled in water for an hour, or longer if there is no hurry; they are to be taken out steaming hot and laid on the floor; the patient is seated on a chair placed over the bricks, and a blanket, thrown over all, is to be fastened round his neck. In a very few minutes the person is perfectly enveloped in the steam, which is kept up by the saturated and heated bricks as long as it is required, and all the effects of the vapour-bath most perfectly attained. It will be found a most valuable mode of restoring heat. In the case above cited, the patient said he felt better "ever after getting warm over the bricks". For this useful application I am indebted to Mr. Twining, surgeon, of Appleby, in this neighbourhood. S. T.

the amount of ozone was excessive; but whether this has had anything to do with our salubrity or not I cannot decide. I have had one case of tertian ague, imported at the middle of July, when there was a little troubleseme brow ague about. In a village four miles north of us typhoid has been endemic throughout the quarter. The portion of the village in which the fever has located itself is considerably elevated; but the houses are small, ill-ventilated, and exposed to noxious effluvia from pigsties and gutters. An old woman died of typhoid fever; her grandchild took the disease and recovered. Its mother, who afterwards came from a town sixteen miles off, in a state of health, was prostrate in a fortnight from the same affection. The village is a rather large one, but poor, and the fever has hitherto been confined to a few houses at one extremity."

The subjoined meteorological report has been furnished by Mr. Dyson: "The meteorology of the quarter ending August 31st was characterised by the extreme heat of the early part of August, the maximum being 93°, and the unusual amount of rain which fell during the same month, the amount collected having been 3·7, or nearly 4 inches. The month of June was cold and showery till the 25th; July hot and fine, especially towards the close. An unusually large amount of ozone was also developed during the month of August, during which frequent and heavy showers of rain fell. The greatest heat of June was 75° on the 10th, the lowest 41° on the 14th. The hottest day in July was the 31st—90°, and the coldest night the 24th—48°. In August the hottest day was the 1st—97°, and the coldest night, 45°, on the 29th. The contrasts during the quarter were the intense heat of July and August, and the wetness of the latter month."

Liverpool.—Mr. Bickerton makes the following report:—"June 8th, 1856. During the past seven days we have been favoured with exceedingly fine weather. Some days have been very hot, but rain has fallen during the night or early morning. There has been a great diminution in the amount of sickness and the number of deaths, viz., 176, is far lower than in corresponding week during last eight years; the corrected average for the same week being 223. Scarlatina caused 4 deaths; measles, 5; small-pox, 1 (primary vaccination); typhus, 9; hooping-cough, 8; syphilis, 1; diarrhœa, 5; diseases of chest, 58; drunkenness, 3: in females, 1, aged 38, ending in apoplexy; 1, aged 38, delirium tremens; and 1, aged 40, from suffocation.

"June 21. During the week 186 deaths have been registered. Scarlatina caused 7 deaths; measles, 10; small-pox, 3 (one not having been previously vaccinated); typhus, 4; hooping-cough, 13; diarrhœa, 7; syphilis, 3; diseases of lungs 64 (32 being from consumption).

"During the quarter ending 21st June, 2,628 deaths were registered, including 159 sudden and violent deaths: being 517 less than in the preceding quarter, and about 600 less than the corrected average for same quarter of last two years. The deaths from zymotic diseases were 535, being 223 less than the average. Scarlatina caused 90 deaths; measles, 90; small-pox, 18; diarrhœa, 60; hooping-cough, 100; typhus, 80; quinsy, 36; cholera, 2; erysipelas, 17; syphilis, 23; diseases of lungs, 850.

"July 5th. During this week 161 deaths have occurred, being a lower mortality than has been registered in any week of the last five years, and 61 below the average of the preceding eight years, for the corresponding week. Scarlatina caused 6 deaths; measles, 16; small-pox, 2 (neither having been vaccinated); diarrhœa, 8; typhus, 7; hooping-cough, 3; diseases of lungs, 49 (32 from phthisis); delirium tremens, 1. The mean temperature was 59·8. The atmosphere has been dry, and reading of barometer has been high. No rain fell during the week excepting a very slight shower on Monday.

"July 12. There have been during the week 176 deaths. Scarlatina caused 12 deaths; diarrhœa, 11; hooping-cough, 8; measles, 6; typhus, 5; small-pox, 2; syphilis, 2; purpura, 1; diseases of chest (including consumption), 45

"July 19. The number of deaths this week has been 175, being 41 less than the average. Scarlatina caused 6 deaths; measles, 9; small-pox, 1; diarrhœa, 17; typhus, 9; syphilis, 1; mumps, 1; diseases of lungs, 49; intemperance, 2.

"July 26th. During the past week there have been 179 deaths, the average being 256. Zymotic diseases caused 53 deaths; scarlatina, 6; measles, 6; small-pox, 3; common continued fevers, 4; typhus, 1; diarrhœa, 29; diseases of the brain and convulsions, 33; diseases of the liver, 2; dropsy, 3; diseases of lungs, 39; and diseases of the heart, 6.

"August 3. In this week 201 deaths have been registered, being 71 below the average. Scarlatina caused 9 deaths; measles, 8; small-pox, 1; diarrhœa, 30; typhus, 2; hooping-cough, 4; quinsy, 2; simple fever, 6; diseases of brain, 34; diseases of lungs, 37; old age, 28; diseases of heart, 5; painter's colic, 1; dropsy, 4. The thermometer

on Saturday was 84° in the shade, being about four degrees higher than any day during the last ten years. The mean reading of the barometer for the week was 30·17 inches.

"August 10. There have been 234 deaths during past week, being 68 below the corrected average. The temperature of the week has been very high, Saturday, August 4th, being the highest, when the thermometer stood at 85·09° in the shade. Scarlatina caused 7 deaths; measles, 5; small-pox, 2; fever, 6; hooping-cough, 6; laryngitis, 2; diseases of brain, 44; diarrhœa, 66 (55 being children under two years old); diseases of lungs, 45; debility and old age, 26; diseases of liver, 4; tetanus, 1.

"August 17th. There were 226 deaths registered this week, being 76 fewer than the corresponding average for the same week in previous eight years. Scarlatina caused 4 deaths; measles, 4; diarrhœa and diseases of bowels, 67; hooping-cough, 4; fever, 2; small-pox, 1; laryngitis, 3; diseases of brain, 18; convulsions, 17; diseases of lungs, 36; old age, 33; diseases of heart, 5; liver, 1; dropsy, 3. There has been a great fall in the temperature from the previous week.

"August 24th. There have been 252 deaths registered during the past week, being 32 less than the average. The great heat has caused an increase in the deaths from diarrhœa. Scarlatina caused 15 deaths; measles, 4; small-pox, 4; hooping-cough, 5; diarrhœa, 75; diseases of the lungs, 34; diseases of brain, 36; old age, 19; diseases of the heart, 4; delirium tremens, 1. The mean temperature has been 65·5°; the mean barometric pressure 29·71 inches.

"August 31. During the week 230 deaths have been registered, being 56 less than the average of preceding eight years. Scarlatina caused 13 deaths; measles, 3; small-pox, 2; diarrhœa, 69 (63 being children under two years of age); typhus, 2; hooping-cough, 3; diseases of brain, 27; diseases of lungs, 45; old age, 10; destitution, 6;* epilepsy, 2; cancer, 4; dropsy, 2; delirium tremens, 1.

"From inquiries made, I cannot find that either animals or plants have suffered from any epidemic diseases during the past three months; on the contrary, there has been generally a remarkable freedom from any serious epidemic affections in this neighbourhood."

Wigan.—Mr. Cox writes: "The most prevalent epidemics

* I cannot understand how this can occur in Liverpool, where the parochial matters are so regularly managed. It certainly looks bad. T. B.

during this quarter have been hooping-cough and croup, occurring as the sequelæ of measles in most cases. They have also shown a very high ratio of mortality. Of seven cases of croup, three proved rapidly fatal. Of thirty-two cases of hooping-cough, five were fatal, by the supervention of extensive lobular pneumonia. The outbreak of measles, which had been terribly severe and of the malignant type, during the last quarter, declined and disappeared during June. The recent cases of diarrhœa have been severe, some of them choleraic; but none that came under my own notice proved fatal. The wind during June and July was chiefly south-east and east, with a very low temperature; during August it was west and north-west, with a high temperature. There was an unusual amount of rain and lightning."

York.—Mr. Procter says: "During the quarter the health of the city has been better than is usual at this period of the year. There has been much less diarrhœa, that though in my cases assuming a dysenteric character, has readily submitted to medical treatment. Several cases of small-pox, mild in their character, have shown themselves."

West Auckland.—Mr. Todd says: "The cases of small-pox were all after vaccination, and were modified and of a slight nature. The cases of puerperal fever were of a low typhoid nature, of that form called puerperal phlebitis. One such case proved fatal, and was attended with secondary deposits, the lungs becoming much affected.

Rothbury.—Mr. Summers writes:—"This quarter has been marked by an almost total absence of epidemic disease in this neighbourhood. Congestive diseases, affecting chiefly the lungs and liver, have been prevalent, as also has rheumatism. There still prevails the asthenic tendency which I noticed in my last report. With the exception of a few days in August, the season has been in this district very cold and backward."

SANITARY LEGISLATION.

SALE OF BAD MEAT IN LONDON.

A COMMITTEE appointed by the Metropolitan Association of Medical Officers of Health have issued a report on the subject of unwholesome meat. The report shows:—1. That large quantities of unwholesome meat are sold in London. In the year 1855, 26 live animals, 612 entire carcasses, 696 quarters, 8 sides, and 227 joints of beef, mutton, veal, and lamb were seized as bad in the city, besides great numbers of poultry and game. But much meat which could not be sold in the city is sold in the suburbs. 2. That the signs of bad meat are *colour*, which is either dingy or too bright; *smell*, which is peculiarly sour and sickening; and *a decided wetness of the meat and soft flabbiness*. 3. That there are also special signs of disease. 4. That illnesses are produced by the eating of bad meat, as tapeworm from measly pork, and poisoning from unsound meat badly cooked.

The subject discussed by the Committee is most important; but we must, in all friendliness, say, that if the members of the Committee wish to direct public attention seriously to so great an evil, they must produce a much more vigorous, scientific, and concise report than the one here noticed, which, in plain truth, and notwithstanding the excellence of the names attached to it, is a loose, hastily concocted, and therefore weak production.

To those interested in the subject of diseased animal food, we would direct attention to a series of replies by M. Soumille of Avignon, to certain inquiries issued in 1854 by the Imperial and Central Society of Veterinary Medicine of France. See *Gazette des Hôpitaux*, October 14th, 1854; and for an abstract, JOURNAL OF PUBLIC HEALTH, April 1855.

THE CENSUS OF IRELAND.

PARTS V and VI of the *Census of Ireland* are now published in three massive volumes. The first volume of the fifth part contains a history of Epidemic Pestilences in Ireland. For profound historical research, it would be hard to find anything that equals this interesting document. In this section of the Journal it would be impossible to enter into an analysis of the labours of the Census Commissioners; but we only reserve the labour for a more fitting opportunity.

REPORT ON THE ADULTERATION OF FOOD.

The final Report of the Select Committee of the House of Commons, appointed to inquire into the adulteration of food, drinks, and drugs, contains many valuable statements and suggestions. The following are amongst the most important in a practical point of view.

"Not only is the public health exposed to danger, and pecuniary fraud committed on the whole community; but the public morality is tainted, and the high commercial character of this country seriously lowered, both at home and in the eyes of foreign countries. Though, happily, very many refuse, under every temptation, to falsify the quality of their wares, there are, unfortunately, large numbers who, though reluctantly practising deception, yield to the pernicious contagion of example, or to the hard pressure of competition forced upon them by their less scrupulous neighbours.

"The adulteration of drinks deserves special notice, because your committee cannot but conclude that the intoxication so deplorably prevalent is in many cases less due to the natural properties of the drinks themselves than to the admixture of narcotics, or other noxious substances, intended to supply the properties lost by dilution.

"The Committee desire to leave the execution of the law against adulteration in the hands of the local authorities, but they are of opinion that very valuable assistance would be afforded to such bodies in ascertaining the fact of adulteration if one or more scientific analysers were to be appointed under the authority of the General Board of Health, to whom the local authorities might, whenever they thought fit, refer any articles seized under suspicion of adulteration for analysis, and who would thus enable the persons charged with the administration of the law to obtain at once, and without cost, a fully competent opinion in all difficult cases.

"These analysers should also undertake to examine any articles sent to them by private individuals, on payment of the expenses of such examination.

"With regard to patent medicines, there can be no doubt that the public health is endangered by the use of several of these compounds; and your Committee are of opinion that the stamp duty, by giving them a seeming Government sanction, has an injurious influence in encouraging their sale and consumption, and should be abandoned whenever this can be done with a due regard to the wants of the public revenue."

THE

JOURNAL OF PUBLIC HEALTH.

JANUARY 1857.

INDUCTION IN THE STUDY OF DISEASE.*

THE method of learning facts and principles by the process of induction, although considered as originating with the labours of Lord Bacon, is really of much more ancient date, and is, in fact, coeval with the origin of philosophy. There is an inductive system, as Mr. Hallam points out, in the writings of Aristotle and the ancients; a fact which Bacon himself recognised, and from which he tried carefully to separate his own design.

The ancient induction was based on the principle of "an inference from a perfect enumeration of particulars to a general law of the whole"; a very comprehensive and accurate view, and, if impracticable, mainly so from its very comprehensiveness.

Bacon, on the contrary, in his system of induction, laid down the principle of deducing universal principles from particular, experimental, or even accidental observations. He based his authority for this step on the assumption that in nature everything is uniform and stable; that whatever has once occurred in nature will, under the same conditions and circumstances, inevitably occur again, and present the same phenomena. This, in a nutshell, is the essence of the Baconian system of inductive philosophy; and thus it is defined, in one brief sentence, in the hundred and fifth aphorism of the first book of the *Novum Organum*.

"The induction", so runs the aphorism, "which proceeds from simple enumeration is puerile, leads to uncertain conclusions, and is exposed to danger from one contradictory instance, deciding generally from too small a number of facts, and those only the most obvious. But a really useful induction for the discovery and demonstration of the sciences, should separate nature by proper rejections and exclusions,

* Lord BACON's Novum Organum, and other works. Montagu's edition. London: 1834.

and then conclude for the affirmative after collecting a sufficient number of negatives."

Again he observes, in aphorism 19, book i: "There are and can exist but two modes of investigating and discovering truth. The one hurries on rapidly from the senses and particulars to the most general axioms, and from them as principles, and their supposed indisputable truth, derives and discovers the intermediate axioms. This is the way now in use. The other constructs its axioms from the senses and particulars, by ascending continually and gradually, till it finally arrives at the most general axioms, which is the true but unattempted way."

In another place, aphorism 24, book i, he refers to the folly of axioms determined upon in argument, "since these can never assist in the discovery of new effects; for the subtility of nature is vastly superior to that of argument. But axioms properly and regularly abstracted from particulars, easily point out and define new particulars, and therefore impart activity to the sciences."

Thus this distinguished philosopher invented, as he presumed, a new mode of induction; and his other writings, relating to science, are intended mainly to fill up the details of the plan he had propounded. But it would be false either to presume that Bacon was right in entirely throwing overboard the old system, or that he was strictly original in inventing the new. He laid down on paper a law which is inherent in mind, and out of this law he constructed a plan of research, of all plans the best adapted for the useful contemplation of nature.

But many men previous to the time of Bacon, and many since who have never read his works, were and are intuitively inductive reasoners after the Baconian plan. Whoever will read carefully the writings of Hippocrates or Plato, will find ample evidence of this line of research. Harvey, the cotemporary, but by no means the admirer, of the lawyer philosopher, and who said sneeringly "that Bacon wrote philosophy like a lord chancellor", was one of the clearest inductive reasoners who have ever appeared; while Kepler, also a cotemporary, but who worked purely by the guidance of his own genius, wrought out the ellipse of the planetary bodies by a grand application of the exclusion process. It was the same with Galileo, who, when investigating with his new telescope the planetary bodies at a period prior to the appearance of Lord Bacon's works, viz., about 1609, worked out solely by induction the fact that the bodies near

to Jupiter were satellites of that planet, and not fixed stars of a small magnitude. For, observing them night after night, he saw them move, and take positions which were incompatible with the idea of fixed stars; and thus progressing from one particular fact to another, excluding impossibles, and collecting negatives, he gained the affirmative that the bodies he saw were the satellites of the planet.

Paracelsus, also, was constantly deducing inferences by casting out impossible causes of natural phenomena; and, in our own day, we are constantly meeting with shrewd men amongst the uneducated classes, who think or reason out conclusions in the most natural manner, by removing out of the field of observation such influences as have, on inquiry, no bearing on the phenomenon under consideration.

These facts, however, in no way detract from the honour that is due to Lord Bacon. No man can invent any principle or law in nature; but some men may discover a law, mark it out, and lay it so plainly before the world, that the dullest may recognise it: and this is what Lord Bacon did for his race, in reference to the principle of induction in philosophy—nothing more.

To see clearly how important was the mission of this philosopher, we have but to observe how indifferently those sciences have progressed toward certainty in regard to the discovery of causes and effects, which have as yet not recognised the meaning and end of the instructions which he proffered. In our own medical science, this fact stands out strikingly. We have no steady, onward, sweeping progress, tending to one point in medicine; and we cannot have it, until we remodel our proceedings, accept the inductive system, and acknowledge a natural philosophy.

This fact is true of medicine as a whole, but specially of that part of it which relates to the study of epidemics. We do not say that here we make no discoveries, for that is scarcely the fact; but such discoveries as are made are stumbled upon, rather than wrought out. A serious admission this is, perchance, and one not palatable to our pride or our wanton wandering industry, but none the less truthful on that account.

Bearing upon the subject of the manner in which men too often investigate the great phenomena of every day life, Humboldt has some deep thoughts which apply most appositely to the pursuit of medical discovery.

"The history of science teaches us the difficulties which have opposed the progress of an active spirit of inquiry.

Inaccurate and imperfect observations have led, by false inductions, to the great number of physical views that have been presented as popular prejudices among all classes of society. Thus, by the side of a solid and scientific knowledge of natural phenomena, there has been preserved a system of the pretended results of observation, which is so much the more difficult to shake, as it denies the validity of the facts by which it may be refuted. This empiricism, the melancholy heritage transmitted to us from former times, invariably contends for the truth of its axioms with the arrogance of a narrow-minded spirit. Physical philosophy, on the other hand, when based upon science, doubts because it seeks to investigate, distinguishes between that which is certain and that which is merely probable, and strives incessantly to perfect theory by extending the circle of observation.

"This assemblage of imperfect dogmas bequeathed by one age to another,—this physical philosophy which is composed of popular prejudices,—is not only injurious because it perpetuates error with the obstinacy engendered by the observations of ill observed facts, but also because it hinders the mind from attaining to higher views of nature. Instead of seeking to discover the mean or medium point, around which oscillate, in apparent independence of forces, all the phenomena of the eternal world, this system delights in multiplying exceptions to the law, and seeks, amid phenomena and in organic forms, for something beyond the marvel of a regular succession, and an internal and progressive developement. Ever inclined to believe that the order of nature is disturbed, it refuses to recognise in the present any analogy with the past, and, guided by its own varying hypothesis, seeks at hazard for the cause of these pretended perturbations."

This false line of inquiry, thus forcibly delineated by Humboldt as opposed to the progress of the physical sciences as a whole, is specially obstructive to the science of medicine.

In medicine we have never as yet accepted these simple truths upon which the Baconian philosophy is founded, viz., that in nature everything is uniform; that that which has once occurred will, under the same circumstances and conditions, but under no other circumstances and conditions, occur again. On the contrary, to take an example, we start at the approach of a spreading disease as though the order of nature were disturbed; we look upon the phenomena involved as the

ignorant look on an eclipse or on a thunderstorm; we recognise in the present no strict analogy with the past, and, guided by our own varying hypotheses, we seek at hazard for the causes.

We take it, therefore, that the first application of the Inductive Philosophy to the study of any disease, consists in recognising in a disease an uniformity and a consistency of nature.

Nor do the facts that in the visitations of disease humanity suffers, and that in the physical and sensation-built body of man the phenomena of the natural event are developed, in any way modify this position; but they rather strengthen it, because they bring the study implied in the inquiry nearer home and conjoin it to dearer interests. For, as we are bound to accept a disease as a natural fact, as fully as we are necessitated to accept an eclipse as a fact of the same order, so are we also bound to study both on the same scientific principles, and to bend our minds to the one as to the other, in recognition of their origin in the supreme will and wisdom of nature, and in the order of the universe.

It is impossible to lay too much stress on these truths, for they are not generally admitted, though universally applicable. Superstitions of old times, the popular prejudices of an incoherent and dead, but not buried philosophy, the idols of the tribe, the den, the market, and the theatre, as Bacon enumerates them—all these are in the way to obstruct true industry, to crush simplicity, and to bolster up mysticism.

A second application of the inductive system of philosophy to the study of diseases, consists in the recognition of a unity of cause for every great natural fact. This rule follows as a necessity upon the preceding one. For there is no phenomenon in all nature which admits, when fully understood, of being referred to, or explained by, *two* causes. And if in any given case two or more causes are supplied, the one of which seems as satisfactory as the other, it is beyond all dispute that the true discovery of the cause of the phenomenon has not been yet alighted on. The affirmative may, it is true, be in one of the causes determined upon, but until the other assumed causes are excluded, or in other words turned into negatives, the discovery is unrevealed.

But in medical investigations even this simple and obvious mode of reasoning is often, if not generally, ignored; and one is constantly finding those who are presumed to be our closest observers, assigning two, three, or even four causes to one disease, so that it becomes in the end a rule, in specu-

lating on the origin of a disease, to speak of its causes and not of its cause.

This is the very error into which the induction of Aristotle was twisted by his followers. And it is owing to this mistake that, for so many men, so many hypotheses as to cause have arisen. One man, speaking of typhus, says that its origin is atmospheric; another thinks it is due to a deficiency of ozone; a third that it is from a specific poison caused in various ways, and carried by water or air; a fourth, that it is a disease of the body *per se*, *i. e.* individual; while a fifth, least consistent of all, is content to accept the idea that all these causes may have their influence, that they club together to get up the exhibition.

Thus, in regard to this one disease as the type of all, the floundering business goes on; there are half a dozen affirmatives assigned, whereas there cannot be more than one; and discovery lingers because the process of eliminating the unit cause, and of throwing the other assumed ones aside as negatives, or as mere coincidences, remains unachieved.

In saying this, it would not be just to assume that no positive facts have been arrived at by the system of simple observation and enumeration of facts, without the trouble of the exclusion process. But the instances of this sort are rare, and when found they are discovered to have been long hidden, though most obvious, and at last accidentally seen. We know for example, in these days, that syphilis spreads by the transmission of a specific poison from person to person—a truth which has been arrived at by the continued observation of vast numbers of cases. We know, too, that small-pox virus, passed from person to person by inoculation, may propagate the disease; that the bite of a dog gives rise to hydrophobia, and so on; but these are accidentally discovered facts, and do not prove anything for or against any system of philosophical research.

The application of the exclusion principle in relation to diseases extends into these branches, viz.: the study of the cause of the disorder; the study of its nature; the study of the treatment. On the first only of these three, viz., that relating to cause, we shall here dwell.

To institute a rigid inductive inquiry into the cause of any disorder, the cause itself being at present unknown, implies, doubtless, great difficulties; but we believe that such an inquiry might be so conducted as to lead to certain success. We do not of course speak of first or efficient causes, for these are out of reach, but of secondary causes or those which are traceable.

In considering an inductive inquiry of the kind here named, the following points are to be recognised :—

1. That the series of phenomena, which grouped together constitute a special disease, have a cause.

2. That this cause is a unit.

3. That at the commencement of the inquiry this cause must either be within cognisance or not within cognisance.

4. That if it is within cognisance, and yet is not known beyond doubt as the cause, the absence of such knowledge is due to the fact, that the said cognisable cause, which is affirmative, has not been isolated from other supposed causes which are negatives.

5. That a true cause must have the following elements. It must be antecedent to the effect. It must be sufficient in itself to explain the phenomena. It must respond to repeated observation. It must respond to direct experiments. It must be recognisable by the senses.

If in any given case a cause can be worked out by these rules, the inductive philosophy has triumphed, and an absolute demonstration has been supplied.

In order to arrive at this ultimatum, the present vague and acknowledged unsatisfactory modes of research must be entirely laid aside, and must be replaced by these principles :—

An acknowledgment of the uniformity of nature.

A careful and extended line of observation directed to the phenomena themselves as they appear in nature; and to the natural agencies which may be presumed to lie at the root of the phenomena.

An experimental inquiry, conducted independently of the natural phenomena observed.

The first of these three principles must be accepted as a matter of faith, based on a reasonable and careful observation of nature as a whole, and on the stability and consistency of all her manifestations. This is a matter beyond dispute; it is most obvious to those who have most knowledge; it is doubted only by the superficial and the ignorant.

The second of these principles must be based on human industry. It demands the abnegation of all assumption or faith. It calls for individual knowledge acquired by the senses, and includes many forms of knowledge and inquiry.

Under this head is embraced the subject of historical investigation. Did the phenomenon occur in any particular part of the globe, in any particular race, at any particular season of the year, during any political crisis or calamity? Did it commence at once at various points, or in one indi-

vidual? Whence did it become transplanted, and by what agency—by land, river, or sea transport? and so on.

Again the phenomena of the disease as they occur to the observer himself and his cotemporaries have here to be considered. The statistics must be collected. And these statistics must include everything that can be conceived as having relation directly or indirectly to the disease, and not only to the disease, but to life and health altogether. They must include particulars which relate to the persons affected with the disease, their occupation, their mode of life, their age, their sex, their habitation, their food and their drink ordinarily and immediately before the commencement of the disorder, and their previous health, the circumstances under which their first symptoms occurred, their exact symptoms during the attack, (for sometimes, during an epidemic especially, other cases of disease are ranked hurriedly with those of the general type), and the medical treatment pursued, not so much with reference to the utility of the treatment as with reference to its effects; for it has occurred that all the original symptoms of an epidemic have been lost in the symptoms induced by the use of presumed remedial measures.

From the individual himself the inquiry must also extend to the external agencies by which he is surrounded, and to the exposures to which he has been subjected. Has he been in contact directly or indirectly with the other sick? has he been exposed to peculiar atmospherical influences? are these general atmospherical influences peculiar? and, if so, have the same peculiarities been marked out in previous periods as connected with the development of the same disorder?

Lastly, the conditions and the positions of those who escape the disorder must be carefully considered, and placed side by side with the conditions and positions of those who have suffered.

These statistical facts, moreover, must be applied to every case under the observer's notice, or the desired end may be lost in the omission. For, in truth, no man makes a fair comparison of what he has seen, unless he compares *all* that be seen, quite independently of any differences which may at first sight occur to the mind.

The very existence, indeed, of an apparent contradiction, should not lead to omissions, inasmuch as in nature a seeming contradiction often proves to be the firmest evidence of truth on further and deeper inquiry.

Whenever an observer meets, in fact, with what seems a contradiction in nature, he meets with a useful and all-important lesson, viz., that he himself is either short-sighted or on the wrong beat; so that he had better, therefore, go over his argument again, wait for further light, or pursue a new course. One of Sir Isaac Newton's grandest discoveries lay quiet for a long season, and was almost given up in despair, though in itself correct, in consequence of his having tried to prove it on an incorrect computation as to the size of the earth.

To return: the statistics of a disorder having been carefully drawn out, they next lie open for analysis. From them the cause has to be found. And now the first step is not to assume any observed fact as a cause, but to strike out unscrupulously all those observations which neither in themselves supply causes nor lead to the idea of causes. If this were carefully done in every instance, the cause of different diseases might be brought down to very narrow limits, and the Baconian system would be strictly carried out; *i. e.*, in Bacon's words, "nature would have been separated by proper rejections and exclusions." Should the result be that *all* possible causes have been excluded, it would follow obviously that the observations made in this special instance had failed; and that further inquiry was needed when the opportunity for conducting it should again occur. If in the result two or more presumed causes hold place, they would have to be reduced by a continuance of the same process, or by further observation. If the one cause were found, and answered to the name of true cause, while all other assumed causes were distinct negatives, or were seen only to be subsidiary to the true cause, the discovery would have been made.

It is to be confessed that this mode of research is laborious and even distasteful, but it has the advantage of approaching to the point, while the opposite course, which is the only one pursued even in the present day despite the great Chancellor's instructions, leads direct away from the point, into generalisations innumerable, and leaves discovery to the chance of accident or adventure.

This point is one which cannot be urged too strongly at the present moment; for surely there never was a time when statistics of disease were so much run after. But of what use are statistics, if begotten with a bias; or if misapplied, after being put together in honesty?

We look upon a man who collects statistics of disease for

the purpose of supporting a preconceived view as absolutely a dangerous man, even though his results shall by accident be correct in the end; for such a man is not investigating nature at all, but is trying to seduce her—a trick which rarely succeeds, for nature is too old a dame to yield up her charms by stealth, or to be carried off by a *coup d'amour*.

The third method of inductive research, viz., induction by experiment, is, perhaps, less applicable in regard to studies bearing on the origin of diseases than it is to others of a more material kind. Still, an entirely new line of inquiry of a physiological character is open to the patient and industrious.

In regard to the production of diseases by physiological means, we labour under the disadvantage of having few animals that are susceptible to the same diseases as man. We therefore have not the subjects for direct experiment.

Finally, the more perfect our science of general physiology, resting on its part on induction, becomes, the more easily is the line drawn which distinguishes between health and disease, and the more competent are we to trace out the connection that exists between assumed cases of diseases, and the symptoms by which those are characterised. Every new and great physiological truth carefully recorded must at some time or another assist the practical physician; and it may be that in some such inquiries a physiological invention, as yet unseen, may suggest itself to meet and conquer a difficulty otherwise insurmountable; since, to take another aphorism from the *Novum Organum*, "It would be madness and inconsistency to suppose that things, which have never yet been performed, can be performed without employing some means hitherto untried."

In bringing forward this subject, we have felt fully alive to the difficulty of dealing with questions of so abstract a nature, and to our own incompetency for making them sufficiently learned on the one hand, or sufficiently simple on the other.

The subject has demanded some extension of thought and some research, and we feel least fear of criticism from those who, having studied it most attentively, are best acquainted with the unavoidable anxiety and labour connected with such a task.

We have felt, however, very strongly the importance of directing the attention of medical inquirers to the points now discussed, and it surely can do no harm to sacrifice these few pages in diverging from the ordinary course of things to consider the questions which this article suggests. Are

the observers in medicine laying out their hard earnings to the best account? Is their bank safe; and will that which they are now hoarding up with miserly care be accepted in after time as good money, true coin of the scientific realm; or as so much waste paper, interesting, perchance, as fractions of an antiquarian's literary museum, but lost to the world at large, and dead with the present generation?

THE PRESERVATION OF FOOD IN ANCIENT AND MODERN TIMES.*

Surely of all the sumptuous dishes that ever came from the hands of mortal cook, from Apicius downwards, there has not been one of a literary character so remarkable as M. Soyer's *Pantropheon*, a book of elegant cast, full of the most exquisite plates, not of trussed rabbits or scored oxen, but of goddesses, antique dishes, banquets, portraits of distinguished individuals, from Epicurus to M. Soyer himself; to add nothing about stewpans, stockpots, winecups, and spoons. Then, as to matter, such classical histories, so voluminous indeed as to require a table of from two to three thousand references from all the great works of antiquity. A truly tremendous scholar is this M. Soyer!

However, with this note of admiration we must end our compliments and introduction. We have to consider a special subject, and we hope to obtain from the *Pantropheon* one or two easily digestible crumbs of information.

The attempt to preserve animal food is of ancient date. It sprang naturally, we presume, from a desire to make provision for days and seasons when it should be impossible to obtain the first fruits of the earth. The drying and preservation of corn and fruits would be the first step in this direction. Then, perchance, followed the invention of cheese, which M. Soyer, following Justin, declares to have

---

* The Pantropheon, or History of Food and Its Preparations from the Earliest Ages of the World. By A. Soyer. London: Simpkin and Marshall. 1855.

Conservation des Substances Alimentaires. Par M. Poggiale. *Gazette Médicale de Paris*, Nov. 1st and 8th, 1856.

Preservation of Alimentary Substances. By M. Poggiale. *Gazette Médicale de Paris.*

On the Composition of Food, and how it is Adulterated. By W. Marcet, M.D., F.C.S. London: Churchill. 1856.

been invented by no less a personage than Aristæus, a demi-god, the son of Apollo himself, and the king of Arcadia.

"The most ancient form of preservation of animal foods," says Poggiale, "is probably that of desiccation, for we know the practice of drying meat in the sun is common all over America; and M. Boussingault has spoken to some negroes of Choco who have never seen an ox, but only know its muscular dried flesh. This learned chemist, indeed, supported himself on dried meats for nearly three years, which he spent in the mines of la Vega during his excursion to the gold and platina washings." However, the meat thus dried is very hard, and affords an unsavoury and indigestible food.

But although the process of desiccation may have been the most primitive and wide-spread, as derived from the observation of the simplest natural phenomena, the mode of preserving by means of salt is of very remote, if not of equally remote date. "Thus the Roman butchers sold both fresh and salt meat. Their mode of preparing the salt meat being as follows. The animals they intended to salt they kept from drinking anything on the eve of the day before killing. They boned the meat and sprinkled it lightly with pounded salt; then, having well dried off all dampness, they sprinkled some more salt, and placed the pieces, so as not to touch each other, in vessels which had been used for oil or vinegar. They poured sweet wine over, covered the whole with straw, and strewed snow all around, in order to make the meat better and more tender. When the cook wanted to extract the salt, he first boiled the meat well in milk, and afterwards in soft water."

The importance attached to the use of salt previous to Roman times is shown by the fact that the Greeks placed this substance in the list of things which were consecrated to the gods; so that it was considered a misfortune to spill salt, and impious to forget to place salt-cellars on the tables, or to go to sleep before their removal.

But there is yet another ancient mode of preserving food, namely, the exclusion of the preserved substances from the air. Thus Apicius recommends, for the preservation of vegetables, that they should be chosen before they are perfectly ripe, placed in a vessel covered with pitch, and sealed hermetically. In like manner, the Roman butchers preserved the flesh of various animals without salt. They covered each piece of meat with honey, put it in a vessel hermetically sealed, and hung it in a cool place—an operation which was said to succeed well. Apicius also recom-

mends, for the preservation of pork, a process of a similar character. The pieces are to be entirely covered with paste composed of salt, vinegar, and honey, and placed in vessels carefully closed,

Lastly, the exposure of alimentary substances to certain gaseous preservatives is a plan of ancient times. Common wood smoke is one of the preservatives which has been thus employed both in past ages and in modern times. In England a very old custom of preserving fruits, gooseberries especially, consists in filling a vessel with the fruit, then burning in the neck of the vessel a piece of sulphur and corking up securely while yet the sulphur is burning. By these means a quantity of sulphurous acid gas is generated, and is diffused through and detained in the bottle, while at the same time a portion at least of the free oxygen surrounding the fruit is removed.

In these four processes are included the practical parts of all modern plans for the preservation of alimentary substances. In order to understand the mode in which they preserve, it is necessary to know in what the process of putrefaction consists. This is well described for us by M. Poggiale.

After death, the vital force no longer opposing itself to the chemical or physical forces, the organic matters present those particular phenomena to which we have given the name of fermentation. The organic elements then form most simple combinations, and this transformation acts by reactions which have no analogy with the ordinary chemical decompositions. No one is ignorant of the fact that organic matters do not putrefy except under the influence of water, of oxygen, and of a suitable temperature, and that if they are withdrawn from the action of one of these agents they do not ferment. All the processes which have been conceived for the preservation of foods are based therefore on these elements—expulsion of the water, withdrawal of the air, and a low temperature; these are the usual means which have been put in practice under a thousand forms.

The subjoined abridgment of M. Poggiale's very complete memoir will give a good idea of the nature of the processes which are now used for the purpose of preserving meat, milk, and vegetables.

PRESERVATION OF MEATS.

The process of Appert consists in enclosing in cylindrical glass or earthenware bottles the aliments, closing the mouth

of the vases with great care, and submitting them during a longer or shorter time to the action of boiling water. Cases of tinned iron are now preferred, because there is no risk of breakage, and they can be closed more securely. The cooked meat, still boiling, is placed in the cases, and pressed down moderately so as to fill the vessel. The circular cover is then soldered to the tin, leaving a small opening in the middle. The vessel is then filled with the juice of the meat or the broth, and a small disk of tinned iron is soldered over the opening. Several cases filled in this manner are placed in a case heated by steam, or in a copper containing boiling water. When they are withdrawn, the covers are convex, but they soon become flat and even concave. This denotes complete success. If the cover remains convex, the preservation of the meat is not ensured. This process consists, then, in destroying the influence of the oxygen of the air. The oxygen which remains enclosed with the meat combines with the organic matters, and can no longer excite fermentation. According to Gay-Lussac, the heat should be sufficiently prolonged to destroy or solidify the substance which has absorbed the oxygen, and which would produce fermentation. It is of course necessary that the vessels be closed accurately, so that the air cannot penetrate into them.

Experience of more than forty years has shewn the success of the process. These preserved meats have been taken across the equator, brought back to London, and sent out again to the polar regions. Sixteen years afterwards the meat was of the best flavour. The campaign in the East has given a new importance to Appert's method. The boxes of meats prepared by this process, and destined for the army in the Crimea, were of excellent quality.

M. Fastier has perfected Appert's process, by almost entirely expelling the air enclosed in the aliments. He introduces the meat raw into the tinned iron boxes; solders the cover, which is pierced with a small opening, then heats the vessels in a water-bath containing common salt or the chloride of calcium so that the temperature is raised to 230° Fahr., and ebullition takes place within the boxes. The steam, and with it nearly all the air, then rushes out from the aperture. The vessels are now completely filled; and the opening is soldered. The boxes are surrounded now with cold water, by which a vacuum is formed in their interior. They are heated a second time; the aperture is unstopped; and when the air and steam have gone off, they are closed anew.

Meats preserved by this process have been found at the

end of a year or two in a perfect state of preservation, of excellent quality, and of agreeable flavour. The Commission of Military Stores has remarked on the superiority of M. Fastier's productions over those of Appert.

M. de Lignac has also modified the process, by introducing the meat in large pieces instead of its being cut up. M. de Lignac also cuts the meat into small pieces, heating it in a stove to the temperature of 104° Fahr., so as to remove about two-thirds of the water, submits it to energetic pressure in a tube of tinned copper, and then completes the process by the ordinary means in closed boxes. M. Poggiale speaks favourably of the results of this process.

M. Cellier employs the following process for the preparation of powdered meat. The bones and the greater part of the fat are taken out; then the meat is cut into strips, which are dried in a stove at the temperature of 122° to 132° Fahr., and reduced to powder by a rasp and pestles. Two parts of powdered meat are equivalent to about four of lean meat, and to six of meat containing the bones and fat. The meat dried by M. Cellier is in the form of a coarse powder, and is capable of long preservation if it be sheltered from the damp and in suitable receptacles, but it is indispensable to deprive it of a large portion of the fat. The small bulk of the meat prepared by M. Cellier's method points to its convenience under certain circumstances of war: but it should be employed only in special cases. Its appearance is not very agreeable; and it has the inconvenience of quickly passing the digestive canal. It is doubtful if young and robust men would be nourished by this powdered meat.

For salting meat the English process, without contradiction, says M. Poggiale, furnishes the best results. It consists in putting pieces of meat in contact with a mixture of saltpetre, common salt, and sugar, and renewing this operation often. But the ordinary processes of salting cause contraction of the muscular fibres, and make the meat hard and often difficult of digestion. Common salt deteriorates the nutritive value of the meat. The salt added takes up from the meat a considerable quantity of water, which carries with it a certain amount of nutritive substance. According to M. Liebig, two parts out of three of meat may, by the action of the salt, become unfit to sustain the vital functions.

Another method of preservation consists in keeping the meat from the action of the air by a covering of gelatine. In this process the meat is covered with a jelly prepared by boiling the tendinous parts of animals for a long time, and

by concentrating the dissolved parts. A small quantity of sugar, of gum arabic, and of brandy, is now added to it, and the pieces of meat, suitably cut, are plunged into this liquid, at a temperature of about 150° or 160° Fahr., and are then suspended in the open air by a hook. This operation is repeated a second time. The next day the envelope is firm.

A committee, composed of MM. Michel Lévy, Laperlier, and Poggiale, ascertained that these meats dry little by little without experiencing any change when they are kept hanging and in the free air, but that the alteration of the covering, and friction during transportation, expose the flesh to the action of the air, and consequently bring on putrefaction. Meats enveloped in gelatine were enclosed in cases, some of which were placed in the military stores, and the remainder sent to Constantinople with orders to send them back to France. On their return, the several samples were completely spoiled.

Another process, proposed by a former professor of the University of France, consists in preserving animal matters, fruit, and vegetables, in sulphurous acid. The alimentary substances are placed in wooden boxes lined with zinc, and having a double bottom of zinc into which chloride of calcium is introduced through a large hole. The upper part of the box has a plate of glass fixed with mastic or a sheet of zinc soldered. Sulphurous acid is introduced into the box and drives out the air through an opening in the upper part. When the acid begins to escape into the atmosphere, both holes are closed with great care. The sulphurous acid without doubt suspends the action of the ferment, which produces the putrefaction of the organic substances. The experiments which the inventor made at the Val-de-Grâce completely failed: all the foods which he attempted to preserve in this way were spoiled at the end of a few days. Experiments, however, which are now made with sulphurous acid, seem to promise good results.

It has been proposed to preserve meats in water containing a tenth of sulphuric acid. The meat is first boned and washed with cold water, and then plunged for an hour into the acid liquor. It is then carefully barreled, and the barrels are filled with water containing a hundredth part of sulphuric acid, and closed as hermetically as possible. According to the inventor, the meat thus preserved appears perfectly fresh; it is juicy, and the broth and the gravy yielded by it are of the best flavour. Unfortunately, the experiments made by a committee at the Val-de-Grâce have not

confirmed these results. At the end of fifteen days the meat was putrid.

A number of attempts have been made to fabricate and preserve meat biscuit and the extract of meat. An American, Gail Bordeu, prepared a biscuit some years since by mixing flour with cooked meat and the liquor in which it had been boiled. The inventor affirmed that the biscuit might take the place of bread and meat, and that about five and a half drachms avoirdupois would suffice to nourish a workman for twenty-four hours, and perfectly maintain his strength. These hopes have not been realised.

M. Callamand prepares a biscuit with a mixture of fifty parts of beef, one hundred of wheaten flour, and ten of vegetables. After the meat has been washed in water acidulated with vinegar, it is cooked with the vegetables for eight hours, and the liquor concentrated. The bones, tendons, cartilages, etc., are taken out, and only the muscles and fat left; the meat is heated afresh; powdered sugar-candy is added in the proportion of one part to 640 of the meat, flour, and vegetables originally used. It is then kneaded together with the flour. The dough is formed into biscuits, and baked about an hour and a half. According to M. Poggiale, M. Callamand's biscuit has a brown colour, and a very distinct smell and taste of fat. It easily crumbles, and does not appear suitable for a long voyage. M. Poggiale found a considerable proportion of fatty matter in the cakes, but less of nitrogenous principles than in the hard corn biscuits prepared at the military stores. M. Callamand's biscuit, and all analogous products, have been rejected by the ministry of war, on account of the uncertainty attending their manufacture, and their deficiency in nutritive properties.

Extract of Meat.—Parmentier has recommended the use of extract of meat in the army. He considers that, mixed with a little wine, it supports the strength of the wounded, and enables them to endure the fatigue of a long removal. M. Liebig says that, in countries where beef and mutton are plentiful and cheap, as in Podolia, Buenos Ayres, Mexico, and Australia, large quantities of extract of meat might be prepared, and imported to Europe. To prepare this preserve, M. Bellat, an apothecary of Paris, takes meat as fresh as possible; removes the fatty, tendinous, and membranous parts; divides it into very thin pieces, and then places them in an apparatus where fresh water is allowed to percolate until the fluid passes colourless and insipid. The products of this operation are then set aside. The

meat is then placed in tubs heated by steam, and hermetically closed by screwed covers, furnished with a service-pipe with a check valve. Its own weight of water is then added, with a quantity of bones. The whole is left to digest during six hours, at the temperature of 194° Fahr., the meat being agitated. It is then submitted to the action of a hydraulic press, and mixed with water and cooked vegetables. The hot solutions are mixed with liquors prepared cold, and heated in evaporating coppers to coagulate the blood; they are then rapidly filtered. These liquids are evaporated in an apparatus to the consistence of very thick honey. The extract of gravy thus obtained is placed in tin boxes, and fastened down after Appert's method. By this process, according to M. Poggiale, the products are not submitted to any treatment likely to induce change in the nature of the broth. This extract must not be confounded with the products known under the name of broth tablets (*tablettes de bouillon*). These preparations contain a considerable quantity of gelatine, furnished by the bones, cartilages, and tendons. M. Bellat's extract of meat is in the form of a yellowish brown mass, rather soft, very soluble in water, possessing smell, taste, and all the properties of meat broth. By dissolving some in boiling water and adding common salt, a savoury broth is obtained, having all the characteristics of good broth prepared from fresh meat. M. Poggiale is of opinion that the richness of this extract in nitrogenous principles, the ease with which it is converted into a broth of excellent quality, its easy transport and preservation, recommend it for the alimentation of troops, and above all for the use of ambulances and hospitals.

A Dr. L. has prepared broth tablets, which have some analogy with M. Bellat's, but which are inferior in many respects. These tablets have an agreeable taste, a reddish brown colour, are not entirely soluble in water, are perfectly preserved in contact with the air, but they contain a considerable proportion of gelatine.

PRESERVATION OF MILK.

Among the processes which have been proposed in recent years for the preservation of milk, those of MM. de Lignac and Mabru have received the sanction of experience; and, in 1855, the Academy of Sciences adjudged them a prize.

M. de Lignac evaporates the milk with a water-bath, in copper dishes which contain a layer of only four-tenths of an inch in depth, and adds 60 parts of sugar to 1000 of milk.

The liquid is then continually agitated, until it is reduced to a fifth of its volume. It is then put into tin boxes, which are heated in a water-bath to the temperature of 221° Fahr. At the end of half an hour, the opening which gave passage to the air and steam is closed with solder. The substance contained in the boxes is yellowish, sweet, doughy, easily soluble in water, and makes a liquid which has all the characteristics of milk, if it has not been too much sweetened. When it is required for use, four parts of water, which is the quantity which has been removed by evaporation, are added to one part of concentrated milk. The Commission of Military Substances has submitted this preparation of M. de Lignac to careful examination: it has constantly shown an irreproachable taste and smell.

M. Mabru's process consists in putting the liquid into metallic bottles, terminated in the upper part by a vertical leaden tube, which communicates with a reservoir also containing milk. All parts of the apparatus are entirely filled with milk. The bottles are then placed, in number about twelve or fifteen, in a large closed vessel, to the inside of which steam is conveyed. The milk is then heated to about 170° Fahr., and, in consequence of dilatation, a part of the liquid rises in the upper reservoir, where it finds shelter from the air by a bed of oil which covers the surface. The air entirely escapes by the vertical tube. At the end of an hour it is cooled to the temperature of about 68° Fahr. The volume of milk diminishes by cooling, but it fills the bottle, as well as the tube which surrounds it. The vessel is then hermetically closed by compressing the tube by means of pincers; the tube is then cut above the compressed point, and solder is applied. The milk is thus guarded from the air, and cannot be agitated in the inside of the vessel. This milk, at the end of three years, presented all the characteristics of fresh-drawn warm milk of excellent quality.

PRESERVATION OF VEGETABLES.

Vegetables may be easily preserved by Appert's method; but the interposing liquids and the vessels which contain these preserves considerably augment the weight and size. On the other hand, the cost of the carriage and the value of the vessels so raise the price of them, that they can only be used by a very small number of consumers.

M. Masson began his researches on the preservation of vegetables in 1844. He had been preceded by MM. Sylvester and Alain, of the school of Grignan, who about 1842

presented to the Horticultural Society of Seine and Oise some dried cabbages.

In 1845, M. Masson obtained a medal of the Royal and Central Agricultural Society. His process at that time differed but little from the old processes; it consisted in exposing the leaves of the cabbages separately on basket-work. In 1850, M. Masson made his first attempt to reduce the size and facilitate the preservation of vegetables by means of the hydraulic press. He reduced the volume of the vegetables about eight-tenths, and gave them the shape of rectangular slabs corresponding to a certain number of rations.

In 1851, M. Chollet added to M. Masson's process a previous scalding in boiling water; a proceeding which is still employed in manufactories for the preparation of certain vegetables. The vegetables prepared by M. Chollet had the smell of hay; and it was necessary, before cooking them, to immerse them in cold water during eight or ten hours, or in tepid water for four hours.

These inconveniences have been removed by a very important improvement, which is the complete cooking of the vegetables before their desiccation, by means of steam at a temperature above 212° Fahr. The vegetables, picked with care, washed, and cut, are cooked in vessels of strong iron by steam coming from a generator. The temperature in the interior of the vessels is from 233° to 240° Fahr; the system of closing, by preventing the escape of the steam, maintains the pressure. The vegetables are cooked in a few minutes. Simmering in boiling water is still used for some vegetables, which require water to dispossess them of some of their acridness; Brussels cabbages, for instance. To this previous cooking the vegetables owe the preservation of their colour and their saccharine principles. The advantages of the employment of steam are its facility of application, the non-interference with the properties of the vegetables, and the coagulation of the vegetable albumen, and consequent prevention of fermentation. Taken from the cooking apparatus, the vegetables are ranged in the drying rooms, a current of air being rapidly carried through at a temperature of 112° to 122° Fahr. Two hours suffice for the drying of spinach, chicory, etc.; three for cabbages, carrots, turnips, etc. Taken from the drying rooms, the vegetables are very crumbly and friable; they are therefore left exposed to the air, that they may gain a little moisture, and thus acquire a certain degree of flexibility. The vegetables are then either compressed or uncompressed. Those which are intended

to be compressed are placed in hydraulic presses, and are found to be reduced about eight-tenths of their volume. The tablets thus obtained are square, hard, and heavier than wood. They are enveloped in paper, and put into boxes of zinc or tin.

Analyses show that the dried and compressed vegetables are richer in nitrogenous matters, and have consequently a higher nutritive value, than the same vegetables arrived at their maturity. The following experiments, made on peas, bring forth the influence of maturity on the relative proportions of water and nitrogenous matters.

		Water in 100.	Percentage of nitrogenous matters in dried peas.
Exp. I.	Very tender green peas	82·25	38·35
II.	Ditto ditto	83·20	38·67
III.	Ditto ditto	80·20	37·98
Exp. I.	More advanced green peas than the preceding	76·14	34·17
II.	Ditto ditto	75·20	34·48
III.	Ditto ditto	75·36	34·46
Exp. I.	Ripe green peas	70·62	27·72
II.	Ditto ditto	70·49	27·43
III.	Ditto ditto	70·87	27·21

M. Chollet furnished to the army, during the campaign in the East, 120,000 rations of preserves a day in winter, and 40,000 in summer. These preserves were composed of tablets of potatoes, and of *julienne* soup, made of carrots, cabbage, and potatoes, of turnips, a small quantity of onions, celery, leeks, and parsnips. In other tablets broad beans were added. These dried vegetables exercised the most happy influence on the health of the French soldiers: the military surgeons have all testified to the hygienic advantages which accrued from the use of the vegetables, especially when the food consisted exclusively of biscuit and salt meat. M. Chollet has tried to associate dried and compressed vegetables with gelatine, by plunging the tablets of vegetables once or several times in a bath of aromatic gelatine containing the juice of meat. He also obtained a series of sizes, according to the thickness of the coats and the number of layers. The soup made from these is more agreeable and alimentary, but it contains too much gelatine.

Another preparation is the semolina of potatoes, proposed by MM. Berncastel and Chollet. To prepare this aliment, the potatoes are cooked, and, after the skin is taken off, they are crushed and transformed into semolina in the usual manner. This product is then dried in a stove: 100 parts of semolina represent about 500 parts of potatoes. The total of nitrogenous matters of potatoes, which is 1·6 per 100, is

raised to 8·580 in the semolina. This substance, however, requires animal food to be associated with it. Pea soup, and rich or weak broth, may be prepared with this semolina. These aliments are very agreeable, and easy of digestion. The small volume of this semolina, the facility of cooking it in water, milk, or broth, its easy preservation and transport, recommend it for army use, particularly for ambulances.

Dr. Marcet, in the concluding part of his very useful work *On the Composition of Food*, enters on the subject of preserved food. He enumerates seven ways of preservation; viz., by cold; by exclusion of air; by drying; by salting; by exposure to smoke; by sugar; by vinegar. Regarding the influence of cold in preventing putrefaction, he refers to the facts that frozen meat and fish are transmitted from Archangel to St. Petersburg; and that provisions are sent, packed in ice, from remote parts of England to London. "If," says Dr. Marcet, "food thus preserved has not undergone the slightest decomposition, it is exactly in the same condition as when quite fresh, and consequently as healthy and nutritive."

On the subject of preservation of meat by drying, this author refers to Dr. F. Verdeil's process, which is evidently in its essentials the same as one of those described by M. Poggiale. Dr. Marcet thus comments on the drying process. "Food thus preserved, whether it be animal or vegetable, has the advantage, first, of preserving in a fresh condition, though freely exposed to the atmosphere, for a great number of years; secondly, of being reduced to about one-fifth of its original bulk, from having lost all its water." The vegetables regain their shape and bulk when boiled in water; the soup possesses all the aroma of the food to such an extent, that it is often difficult to notice the difference between it and soups prepared from recently gathered vegetables.

In what has been already written, we have supplied the reader with a knowledge of all the more important plans of preserving foods. If we were asked for a choice of plans, we should certainly go with Dr. Marcet in recommending Verdeil's. In a sanitary point of view, it is a matter of considerable moment to put out of fashion the plan of preserving meats by salt; salted preserves being at once indigestible, and, if long continued too exclusively, the certain cause of some adynamic disorders, such as scurvy.

In glancing at the previously named plans of preserving foods, it will be seen that they are all directed virtually to the end of preventing the action of oxygen on the dead tissue.

It should at the same time be explained, however, that, in order to prevent this oxidation, it is neither necessary to subject the meat itself to any process, nor even to remove it from the presence of oxygen. There are in nature various gaseous agents which, when commingled with oxygen, prevent the action of that gas, by exerting a kind of counter-affinity. These agents, all of which are for this reason preservatives of animal and vegetable structures, are creasote vapour, chloroform vapour, carbonic acid gas, common coal gas, and sulphurous acid. To these others might be added, which are preservative, but are not applicable for foods. It is remarkable that even oxygen itself, when used in the pure form, *i. e.* undiluted with nitrogen, has a certain degree of antiseptic power; and we have ourselves kept a portion of beef in oxygen gas for many months, the meat itself undergoing but little visible change. This, however, is not sufficiently effective. The most effective plans consist, first, in having made an air-tight iron safe. In this the meat must be suspended; and then, if sulphurous acid is to be the preservative, a small lump of burning sulphur must be laid on the floor of the safe, the door being instantly closed, so that the sulphurous fumes may not escape. If chloroform is to be used, a few drops should be dropped simply on the floor of the safe, and so be left, the door again being closed instantly. If carbonic acid gas is used, it will first have to be generated outside, and then be driven into the safe, previously closed and containing the meat, through a stop-cock.

It is unnecessary to extend these descriptions, because the old fashioned sulphur process, and the new fashioned chloroform process, answer all practical purposes, and are by far the simplest and readiest in application. The vapours of these agents, in which the preserving power lies, are innocuous by the time the food comes to table, since they are driven off in cooking. In the year 1851, the writer took occasion to show that the immersion of animal structures in pure nitrogen, in bottles hermetically sealed, was an excellent mode of preservation; and he has since found that the placing of a stick of phosphorus in a closed vessel with animal substances, answers for a time remarkably well, the phosphorus removing the oxygen. He does not, however, at this moment recommend this last named mode for the preservation of edible substances, the effect of the phosphorous vapours on the preserved tissue being unknown.

THE EPITOME OF SANITARY LITERATURE.

CONTAGIOUS FURUNCULOID DISEASE.*

UNDER the head of Contagious Furunculoid, Dr. Laycock includes eight forms of disease developed on the skin; viz., the simple furuncle; effusive inflammation of the derma; suppurative inflammation of the derma; carbuncular inflammation; two or more of these varieties occurring together; sloughing gangrene of the lip, eye, and tongue; diffused inflammation of the cellular tissue (phlegmon); and whitlow.

Dr. Laycock believes in the contagious character of boils, and quotes a case from a paper of Dr. Richardson's, in which the disease seemed to have propagated from a mother *enceinte* to the unborn child. In some cases the contagion may spread from the inferior animals to man, as from the horse. In this case, the form of disease is to be considered as special. The recent boil epidemic has been generally prevalent throughout the world. In England and America it has been coincident with various epidemics, as typhus, influenza, cholera, small-pox, scarlatina, hooping-cough, and croup. This coincidence is probably no more than an "epiphenomenon". The treatment is to improve the general health, and to render the local mischief abortive by the application of iodine tincture or caustic. It remains an important question, whether the eating of diseased animal food may not be one means by which the disease is communicated.

THE PRESERVATION OF NATURAL MANURES.†

THE valuable fertilising agents of all manures, which require to be preserved, are phosphoric acid and ammonia. The agent by which the author proposes to preserve these valuable substances, is a compound of two acids, the sulphurous and carbonic, and two bases, magnesia and lime. The compound is "a sulphate of magnesia and a carbonate of lime". When mixed with the manure, the sulphurous acid, from its affinity for oxygen, prevents putrescence; while the magnesia enters in combination with the phosphoric acid and the ammonia, forming the triple phosphate of magnesia and ammonia, the best of all compounds for agricultural purposes.

---

* On the Pathology and Treatment of the Contagious Furunculoid Disease. By THOMAS LAYCOCK, M.D., Professor of Medicine in the University of Edinburgh. Edinburgh: 1856.

† The Preservation of Natural Manures. By ALEXANDER MCDOUGAL. London: Whittaker. 1856.

This disinfectant has, it is said, been extensively used for sanitary purposes. It is supplied to most of the transport ships in the service, and has been used in vaults, coffins, and graveyards with advantage. The expense of it is merely nominal; and it is applicable to the disinfecting and preservation of night soil. Mr. McDougal observes in conclusion :—"There are certain relations established between the animal and vegetable kingdoms, with which all our arrangements ought to harmonise; for unless they do the results will be neither economical nor sanitary. The plant gives off as excrementitious that upon which the animal subsists, while it vegetates luxuriantly upon that which the animal ejects. These two departments of nature are the complements of each other. If animal refuse is carefully preserved in the condition in which it is best adapted to supply food to the plant, it will not only give healthiness to the homestead, but clothe the fields with verdure and endue them with fertility."

HEALTH OF THE CITY OF LONDON.*

THE total mortality in the City of the year ending Michaelmas is 2,910, or nearly 17 per cent. less than the last year, and about 11 per cent. less than the eight preceding years; "in fact, the death rate of the whole city has been reduced from a general average of 24 per 1000 of the inhabitants, to 22. The death rates differ in proportion in different districts. In the City of London Union, the mortality has been from 15 to 19 in the thousand; in the eastern part, from 22 to 28 in the 1000; and in the southern part of the West London Union, the mortality has risen to 30 in the 1000." The higher mortality of the last named districts depends on the fact that the inhabitants are more firmly fixed to their homes, rather than from the improved sanitary state in the City of London Union. The infant mortality is high. Out of the 2,910 deaths, 38 per cent. were in children under five years of age. This mortality is of course greatest in the crowded alleys and courts of the Eastern and Western Unions. But this is not a fair calculation, for London is not the nursery of its own population. To learn how great is the death rate of infants, the proportion of the dead to the living must be ascertained. In doing this, it will be found that in England the mortality of children under five is about 68 in the 1000, and in country districts only 37. In the city of London it is 82, and in the western division 104.

* Report on the Sanitary Condition of the City of London for 1855-56. By HENRY LETHEBY, M.B. London: 1856.

This represents a mortality 52 per cent. above the average of England, and 181 over that of the country.

The death rate of adults is scarcely less remarkable. Taking the mortality of 15 in the 1000 as natural to this country, it will be found in some parts of the city that this is doubled; and while in England generally the mean duration of life, with men who have reached the twentieth year, is forty years, in the city it is but thirty, and in the western parts only twenty-eight.

Looking at the density of the population of England, we find that there is but one person to every half acre of surface; while in the city there are 179 persons to an acre, and in the western districts 212. This fact, combined with the habits of the people, explains the mortality. The principal fatal diseases are fever, consumption, and infantile disorders.

Dr. Letheby's *Report* is a valuable addition to State Medicine documents.

DIET IN INFANTILE ECZEMA.*

MR. WILSON recommends the following diet in this very troublesome affection:—"The diet of the child, while under this treatment, must be carefully inquired into; it should be good, wholesome, and nutritious. The leading constitutional indication is to nourish properly; and this idea should be carried out in the food as well as in the medicine. I find the juice of meat of great value in these cases, and it may be given either alone, as beef or mutton tea, or mixed with the other food. The consideration of diet and food brings me to an important dietetic medicine, which is of great value in this disease, when the latter is attended with emaciation, and in the chronic stage; in acute cases it is less applicable; I mean the cod-liver oil. The child will often take the oil greedily in its natural state, and its good effects on nutrition are speedily made apparent: it may be given with safety to the youngest infant. In children somewhat older, and particularly in chronic cases, the cod-liver oil chocolate becomes a useful ingredient of diet."

TREATMENT OF PULMONARY CONSUMPTION.†

ALTHOUGH this book was written long ago, it is new to us; and we notice it specially, because it is the express wish of

* On Eczema Infantile. By ERASMUS WILSON, F.R.S. London: Richards. 1856.

† The Treatment and Cure of Pulmonary Consumption, on Principles Natural, Rational, Scientific, and Successful. By GEORGE BODINGTON, Surgeon. London: Longmans. 1840.

the editor to say that Mr. Bodington, in this brief treatise, had anticipated many arguments and facts of a similar nature to those given in the paper on the *Hygienic Treatment of Pulmonary Consumption*, in our last number. All these would have been noticed had they been known at the time. It is not too late to note some of them now, nor will the labour be lost. At the time when Mr. Bodington's essay appeared it was rather severely handled, as we are informed, by the critics. It will be satisfactory to him to see that the times have changed, and that a periodical specially devoted to the independent advocacy of such truths as he so boldly set forth, now finds an educated and scientific circle of readers, and is worked by a staff of contributors who are thought all the sounder as practitioners because they go in for essentials, and protest for natural and rational principles in the prevention and treatment of disease.

Speaking of pure air in the treatment of consumption, the author remarks:—

"I believe, having mentioned the shutting up plan in close rooms, the use of antimony and digitalis, if I add the use of demulcents, of blisters, leeches, plasters, etc., I shall have described the helpless and meagre system of medical treatment of consumption in general use at the present day, the utter uselessness of which is so well known and so obvious, that the members of the medical profession in the towns are in the habit of dismissing their patients to some distant sea-port or watering-place, where, falling under precisely the same mode of treatment, they commonly die. . . . . There is nothing gained by resorting to the coast; in truth, the interior of the island is the best; the air is just as pure and much milder, and more suitable for the lungs of consumptive people, if they will but breathe it. There is but one other proposition in the way of treatment to which I have to allude, I mean to the inhalation of gases of various kinds, by which means it is proposed to convert the cough of consumption into a catarrhal cough, which catarrh is to continue so long as the patient lives, or, discontinuing, the consumption would supervene. . . . The only gas fit for the lungs is the pure atmosphere freely administered, without fear; its privation is the most constant and frequent cause of the progress of the disease. To live in and breathe freely the open air, without being deterred by the wind or weather, is one important and essential remedy in arresting its progress;—one about which there appears to have generally prevailed, a groundless alarm lest the consumptive patient should take cold. Thus one of the essential measures necessary for the cure of this fatal disease is neglected, from the fear of suffering or incurring another disease of trifling import. No two diseases can be more distinct from each other than consumption and catarrh; it is the latter only which

might be caught by exposure to atmospheric causes; with the former they have nothing to do. Farmers, shepherds, ploughmen, etc., are rarely liable to consumption, living constantly in the open air; whilst the inhabitants of the towns, and persons living much in close rooms, or whose occupations confine them many hours within doors, are its victims: The habits of these latter ought, in the treatment of the disease, to be made to resemble as much as possible those of the former class, as respects air and exercise, in order to effect a cure. How little does the plan of shutting up the patients in close rooms accord with this simple and obvious principle. As to the result of such a practice, it is known to all, one-fifth of the deaths annually in England are from consumption, whilst cures are scarcely ever heard of and never expected.

"The most important remedial agent in the cure of consumption, is that of the free use of a pure atmosphere; not the impure air of a close room, or even that of the house generally, but the air out of doors, early in the morning, either by riding or walking; the latter when the patients are able, but generally they are unable to continue sufficiently long in the open air on foot, therefore riding or carriage exercise should be employed for several hours daily, with intervals of walking as much as the strength will allow of, gradually increasing the length of the walk until it can be maintained easily several hours every day. The abode of the patient should be in an airy house in the country; if on an eminence the better. The neighbourhood chosen should be dry and high; the soil, generally of a light loam, a sandy or gravelly bottom; the atmosphere is in such situations comparatively free from fogs and dampness. The patient ought never to be deterred by the state of the weather from exercise in the open air; if wet and rainy, a covered vehicle should be employed, with open windows. The cold is never too severe for the consumptive patient in this climate; the cooler the air which passes into the lungs, the greater will be the benefit the patient will derive. Sharp frosty days in the winter season are most favourable. The application of cold pure air to the interior surface of the lungs is the most powerful sedative that can be applied, and does more to promote the healing and closing of cavities and ulcers of the lungs than any other means that can be employed. . . . Many persons are alarmed and deterred from taking much exercise in the open air, from the circumstance of their coughing much on their first emerging from the warm room of a house; but this shows that the air of the room was too warm, not that the common atmosphere was too cold. To live in a temperature nearly equal to the latter at all times should be the aim of the patient, who should avoid warm close rooms as much as possible, and always keep away from the fire, taking care to keep the surface of the body warm by sufficient clothing. Thus the equal temperature so much considered, and said to be necessary, should be that of the external air, instead of that so commonly employed, the warmth of a close room.

"The powerful effect of the early morning air, in allaying excitement, is so great and so superior to all other means, that it should, in my opinion, under the eye and by the regulation of the medical attendant, form the foundation of the whole course of treatment; without it, he will not be enabled to administer the due proportion of stimulating and nutritious aliment; it is the proper preparation for the administration of medicinal sedatives; by it the muscular power is preserved from undue exhaustion, and the sanguiferous system from running away in waste; for this course of treatment I have invariably found to diminish the rapidity of the pulse. The profuse nocturnal perspirations are also soon subdued by this method of treatment, and the great debility they occasion avoided. The skin assumes a healthier action in proportion to the extent of exposure to the external atmosphere, particularly to the morning air."

Referring to diet, he observes:—

"In order to restore a consumptive patient, it will be necessary especially to attend to the following matters. We shall find first of all a rapid and weak pulse, ranging from 120 to 140 beats a minute, clearly indicating a deficient supply of blood, and the heart and arteries irritable in proportion to this deficiency. This condition must be met at once, not by the means termed 'antiphlogistic,' but with frequent supplies, in moderate quantities, of nourishing diet and wine; a glass of good sherry or Madeira in the forenoon, with an egg, another glass of wine after dinner, fresh meat for dinner, some nourishing food for supper, such as sago, or boiled milk, according to the taste and digestive powers of the patient. This will be supplying means to rectify the morbid conditions of the nutritive functions, and to allay the irritability of the heart and arteries."

Lastly, concerning hospitals for consumptives, he adds:—

"With respect to the consumptive poor patients, those who cannot afford to pay for a proper treatment of this sort, hospitals should be established in the vicinity of large towns, in fit situations, and properly appointed in all respects for their reception and treatment. In these there should be provision made for affording them carriage or horse exercise; and gardening, and farming occupations, for the convalescent. The common hospital in a large town is the most unfit place imaginable for consumptive patients, and the treatment generally employed there very inefficient, arising from the inadequacy of the means at command. . . . Connected with a consumption hospital, provision should be made for the employment of the convalescent and cured patients, who ought never to return to their former occupation, but should be employed after as agricultural labourers, gardeners, or in any other pursuit, rather than return to their former occupation."

Of the pathological views of Mr. Bodington we do not speak; indeed, the science of pathology has so changed since

1840, that he would probably not now hold out himself in favour of these. The practice he may well cherish, however; for it is becoming more and more widely recognised as the world revolves each day.

THE CLIMATE OF ASPLEY GUISE.*

Dr. Williams has here given a very pleasantly written and interesting book. He makes out a good case for Aspley Guise as a residence for invalids, and shows that England has in herself the advantages which sick tourists seek abroad. The mean annual temperature of Aspley Guise is $47\frac{1}{2}°$, the range of temperature 8°; the annual fall of rain is $18\frac{1}{2}$ inches. The stratum is of sand; the water is good: and the mortality is from fourteen to fifteen per thousand. Dr. Williams's book may be perused with advantage by those who wish to select a residence, permanent or temporary, for the debilitated and consumptive.

We have several other books on our table, which for the present we must pass over with brief notice. Mr. Gamgee's *Researches*† are excellent, and add new credit to their able author. Dr. Routh's extended paper on *Fæcal Fermentation*‡ deserves the same praise. Dr. Leared's paper on *Phthisis*§ is a valuable statistical document. Dr. Lombard's *Climats de Montagne*‖ is an instructive work, shewing the physiological effects of various mountain climates. Dr. Hyde Salter's *Introductory Address*¶ contains some excellent advice to students, given in plain language. Dr. Barnes's *Report of the Sanitary State of Shoreditch*, and Dr. Ballard's on *St. Mary, Islington*, will claim further attention. Dr. Stark's *Meteorology of Scotland*, for the June quarter, is compiled with much care and industry.

* Observations on the Topography and Climate of Aspley Guise, Bedfordshire, in Reference to their Influence on Health and Disease. By James Williams, M.D. London: Richards. 1856.

† Researches in Pathological Anatomy and Clinical Surgery. By Joseph Sampson Gamgee. London: Baillière. 1856.

‡ Fæcal Fermentation as a Cause of Disease. By C. H. F. Routh, M.D. London: Richards. 1856.

§ An Analysis of a Hundred and Thirty-Six Cases of Phthisis. By Arthur Leared, M.D. London: 1856.

‖ Des Climats de Montagne, considérés au point de vue Médicale. Par le Docteur H. C. Lombard. Génève: 1856.

¶ Introductory Address delivered at Charing Cross Hospital, October 1, 1855, on occasion of the opening of the Twenty-Fourth Session of its Medical School. By Hyde Salter, M.D. London: 1856.

ORIGINAL COMMUNICATIONS.

ON THE PROTECTIVE AND MODIFYING POWERS OF VACCINATION.

By EDWARD C. SEATON, M.D., Vice-President of the Western Medical and Surgical Society of London.

[*Read at the First Meeting of the Society for the Session* 1856-7.]

FIFTY-EIGHT years have now passed since the first promulgation to the world of that great discovery of Jenner, which has already saved so many millions of human lives, has rescued so many millions more from hideous deformity, and has justly procured for its author a place among the most illustrious benefactors of mankind. In his first treatise, entitled *An Inquiry into the Causes and Effects of the Variolæ Vaccinæ,* published in 1798, Jenner gave a lucid account of the disease popularly known as the cow-pox; showed how it was frequently communicated by accident to man, and detailed the phenomena produced by such communication; gave proof, by long continued observation and by experiment, that when the system had been thus once infected, it remained afterwards secure from the infection of small-pox, whether by variolous effluvia or by inoculation; showed that the cow-pox itself might be propagated from man to man by inoculation, and that so propagated it exercised the same protective power as when taken directly from the cow; and suggested, therefore, that it might be possible to introduce a mode of inoculation safer and in every respect preferable to the variolous inoculation, which was then in use. "This inquiry", he modestly says in conclusion, "I shall myself continue to prosecute, encouraged by the hope of its becoming essentially beneficial to mankind." To the further prosecution of this subject it is well known that he devoted the remainder of his life. The progress of his experiments, observations, and opinions, may be traced in his various works, and in his published letters: and it is a striking proof of his sagacity, and of the profound thought he had given to the subject, that his rules and cautions with regard to the process of vaccine inoculation, or vaccination, as it is now termed, are those which guide the practice of the best vaccinators of the present day; that his theoretical view of the identity of cow-pox with human small-pox has received decisive proof, in our own time, from the experiments of Ceely; and that his sanguine anticipations of the benefits

to be conferred on mankind by his discovery are far on the way to be realised,—if not absolutely and entirely, at all events to all practical purposes.

To say, indeed, that he was in error in none of the views which he propounded, or that he left nothing to be added to his discovery, would be to claim for him foresight more than human. But these errors and deficiencies were few; the more his writings are studied, the fewer will they appear to be; and, in many instances, where his statements have been called in question, it has happened that particular expressions have been taken hold of, and used in a sense in which he certainly never intended them. When he spoke, for example, of the security against small-pox afforded by vaccination as *perfect*, he meant (and by his very hypothesis of the identity of cow-pox with small-pox he could have meant nothing else) that it would protect the constitution to the same extent and in the same way in which an attack of variola itself would. "Duly and efficiently performed", he observes, "it will protect the constitution from subsequent attacks of small-pox as much as that disease itself will. I never expected it would do more; and it will not, I believe, do less." Whether this opinion is sustained by all the facts which have now accumulated, or whether, indeed, there are yet facts enough of a precise and positive character to enable us to determine the question authoritatively, is one of the points we shall have to enter upon immediately; but the opinion is clearly something very different from that which has been attributed to him, viz., that he represented vaccination as an *infallible preventive*, and maintained the *impossibility* of small-pox after it.

Again, when he looked forward, as he undoubtedly did, to the extermination of small-pox by vaccination, it is not to be supposed that he expected such a consummation to be brought about until the practice should have become universal: and when this shall be so, as it will certainly one day, however tardily, be, we shall have to see whether his expectations may not yet be realised. The charge of presumptuousness which has been brought against him may then have to be withdrawn; and the note of triumph, which was sounded a few years ago, because after a lapse of fifty years small-pox was still rife amongst us, may be changed. Not fifty, nor five hundred years, will suffice to determine the truth of the anticipation, while there remain any unprotected to receive and to convey the seeds of that pestilent disease.

It is greatly to be lamented that the rules and precautions

which Jenner laid down with so much care and precision, for the performance of vaccination, should have been in so many instances neglected or departed from; and that, from the very simplicity of the operation, it should not always have received, either from medical men or from patients, that attention to which it was entitled, as an operation intended to protect for life from the attacks of a fearful disease. Had this not been so, we should at all events have been free from one difficulty, which encounters us now at every turn, in our endeavours to estimate the exact protective value of the Jennerian discovery,—that arising, namely, from the necessity of determining, in cases in which vaccination is said to have failed, whether there has really been effective vaccination or not. In such a society as this, I need scarcely say that it is not the insertion of lymph into the arm, nor the production merely of a vesicle, which constitutes vaccination: *the vesicles to be produced must have a specific character, and go through a definite course, indicative of a particular constitutional affection: and it is only when this character is perfect, and this definite course has been normally gone through, that there is protection;* or at all events a full measure of protection. Of inefficient and spurious vaccination there was plenty in Jenner's time, and he taught and wrote much about it; and we have it on the testimony of men from all parts of the country, largely engaged in vaccinating, that there is plenty still. This is a point to which I shall have again to advert hereafter.

That efficient vaccination will protect the system against an attack of small-pox absolutely as a rule, and that even under circumstances of the severest exposure, is so well known that it needs no proof nor illustration. It is equally certain that small-pox will sometimes occur after the most perfect vaccination; that it will occur with much greater frequency after spurious or imperfect vaccination; and that it may be met with in those who have already had the disease casually or by inoculation. But when we strive to determine and compare the ratio in which individuals, protected by vaccination, perfect or imperfect, and those protected by casual or by inoculated small-pox, are liable to take small-pox subsequently, we find the greatest possible difficulty. For this comparison we need, in the first place, that the inquiry should be made on a sufficient number of individuals similarly circumstanced as to age, condition of life, various external circumstances, and liability to exposure: where vaccination is alleged, we have, as I have already said, to

determine whether there has been real vaccination or not: and where small-pox is alleged, we have to determine that it was this disease which really had been gone through: then, as regards the alleged small-pox occurring after such vaccination or previous small-pox, we have to be certain that there is no error in diagnosis,—that we have really before us a case of variola, and not one of those many affections which have at times been mistaken for it. Now it is obvious that such an inquiry as this can only be instituted with regard to particular classes of individuals; and as regards one class of individuals—children under puberty—the inquiry *has* been made under circumstances which admit of every confidence being placed in the result.* Every boy admitted into the Royal Military Asylum at Chelsea, not bearing satisfactory marks of small-pox or cow-pox, is vaccinated; and we get thus a community, all of them protected, but some by inoculation or casual small-pox and some by vaccination. Now, of 5,774 boys admitted from the opening of the establishment in 1803, to December 31, 1851, 1,950 had on admission marks of small-pox, and 3,824 had either marks of vaccination, or were on admission vaccinated. Of the 1,950, twelve, or 6.15 per 1,000, had small-pox subsequently; of the 3,824, twenty-seven, or 7.06 per 1,000, had small-pox subsequently. Now here we had present all the conditions to which I have referred as requisite for a perfect comparison: and not only the number of persons, but the length of time over which the observations extend, warrant, as Dr. Graham Balfour justly says, reliance being placed on the results; and these are, that as regards children under puberty there is scarcely any difference in protective value between cow-pox and previous small-pox, and so far the opinion of Jenner is entirely confirmed. And, before going further, I must remark that the experience of this asylum places beyond all doubt that the recurrence of small-pox, or its occurrence after inoculation, is by no means the very rare thing it has been represented by some to be. We read statements of a vague estimate by De La Condamine that the cases which so occur are not more than one in 10,000, and we are even told to look upon this as exaggetated; but we have here an example in which out of every 1,000 more than six have had a second attack in a population certainly not peculiarly exposed to infection, and before any

* Dr. T. G. Balfour, On the Protection against Small-Pox afforded by Vaccination, in *Medico Chirurgical Transactions*, vol. xxxv.

have reached the age of manhood. I have already adverted to the care which must be taken in investigating such cases,—as indeed in investigating cases of small-pox after alleged vaccination; but in this instance the evidence of the primary disease was, in every case, the characteristic marks left by it, and the second attack was watched through its whole course by observers whose competence to discriminate accurately cannot be called in question. And I must express here emphatically my conviction that, if a case of small-pox has been observed *throughout its course* by a medical man, there is not often a mistake. In an admirable paper by Mr. Marson,* to which I shall have occasion to refer by and bye, he mentions that 185 cases have been sent to the Small Pox Hospital in sixteen years as variola, which turned out to be no variola at all;—but these, it must be remembered, were all or mostly sent in the onset of the disease, when the difficulty of diagnosis must be acknowledged by all. The limits of this paper do not allow me to pursue this subject further, nor to present a variety of facts confirmatory of the view I have advanced, that small-pox after small-pox may occur more frequently than has been supposed: but it was essential to draw attention to the subject, which must be well kept in mind in any review we may take of facts bearing on the protective value of vaccination.

The comparison we have made in the case of the Royal Military Asylum between the protection of vaccination and that of previous small-pox is complete as far as it goes; but it unfortunately stops short just as we are entering the period of life when the protection of vaccination is said by some to begin to wear out, that is to say, the age of puberty. Now the army gives us a class of men, all of whom have passed this period of life, and all of whom by the rules of the service, should be, and we presume are, protected. About 78 per cent. of the whole are protected by vaccination, and the remaining 22 per cent. by previous small-pox. Now, in a force so protected and in many instances, as Dr. Balfour has shown, considerably exposed to small-pox, the annual ratio of cases has not been greater than sixty-six to every 100,000 men, or rather more than half a case per 1,000 men. Unfortunately these statistics are not available for the comparison we desire to institute of the *relative* protection afforded by vaccination and by previous small-pox, because it is not recorded with regard to the cases how many occurred in

* On Small-Pox and Vaccination. *Medico-Chirurgical Trans.*, vol. xxxvi.

those protected in the one, and how many in those protected in the other way. But they are unexceptionable evidence of the general protecting value of vaccination, four-fifths of the force owing its protection to that alone.

In the navy, by the rules of which service also all should be protected, there is the same impossibility of ascertaining how many cases have occurred in the vaccinated and how many in those protected by previous small-pox: and there is also the same general testimony to the protecting value of vaccination. In this force the cases are slightly more numerous, having been 417 on an aggregate strength of 363,370 men, or rather more than 1 (1.148) per 1,000. This increase over the ratio prevailing in the army (115 per 100,000 as against 66 per 100,000) Dr. Balfour attributes to the crowding on shipboard, and the consequent difficulty of separating the healthy from the sick. Doubtless these causes would so operate; but on the other hand it is probable that sailors, though often considerably exposed, as Dr. Balfour has shown, are less so on the whole than soldiers, who are frequently quartered for long periods together in large towns: and I do not doubt that the real explanation is that the rules of the service are not so well carried out, for many obvious reasons, amongst them as in the army. In looking over the returns from the particular ships in which small-pox had appeared, I find it stated expressly in some cases that there had been *no* protection, and in others that it is doubtful whether there had been protection or not.*

To understand the full value of these facts it is desirable to compare them with the results ascertained in the Royal Military Asylum, and to make the calculation therefore for that institution on the same principle on which it is made for the army and navy, that is, according to the aggregate strength and not according to the mere numbers admitted: it will then appear that the proportion of attacks from small-pox for every 100,000 individuals is

Among the soldiers - - - - -	66
Among the sailors - - - - -	115
Among the boys - - - - -	123

The immunity therefore is absolutely greater among the soldiers and sailors than it is among the boys. It is quite true that the relative protection afforded by vaccination and

* Even in the army it is probable there are some unprotected, especially on colonial stations. Inspector-General Dr. John Davy states that it is only by the strictest superintendence, and by returns at short intervals, that thorough vaccination can be kept up.

by previous small-pox may not be the same, as it has been ascertained to be among these latter; we have no facts enabling us to state whether it is so, or whether it is not: but as to the wonderful extent of protection afforded by vaccination in classes quite as much exposed to small-pox as the bulk of the community, and the individuals comprising which are above the age of puberty, the returns are conclusive. I may remark too that the great majority of the cases in the army occurred between the ages of fifteen and twenty-five, a period of known proclivity to small-pox; and that there were comparatively few after this latter age, a result quite at variance with the notion that the vaccine protection gradually wears out,—for, on that hypothesis, the longer the period that has elapsed since vaccination the greater should be the liability to attack. Now, in the United Kingdom, in ten years, there were among the soldiers forty-three deaths from small-pox on an aggregate strength of 133,874 under twenty-five years of age, and only twelve deaths on an aggregate strength of 110,723 above that age. This question is one of the greatest importance, and demands a separate investigation, into which I hope at some future time to enter. In the meantime, I will only observe that I am in possession of a large number of facts from returns to the Epidemiological Society, which are quite in accordance with this result, and which show that the liability to small-pox after twenty-five in persons vaccinated is far from increasing, as it should do if the vaccination wore out.

But it is desirable to subject vaccination to a severer test, and to inquire what is the degree of immunity afforded by it under circumstances of long continued and frequent exposure during epidemic influence. These are the conditions under which the greater number of failures undoubtedly occur, and they are also those under which the practice has to record its greatest triumphs, for it is precisely under these conditions that without protection *scarcely one* escapes. There are not observations sufficiently accurate and on a sufficiently large scale to justify positive numerical conclusions on this subject: but some interesting facts have been observed. During an epidemic in Chelsea in 1838-9,* Mr. Marshall inquired into the circumstances affecting 757 individuals, all of them severely exposed to small-pox, for they were members of families in each of which there had been at least one case (generally a fatal one); and in the condition of life in which they were, a case in the family implied in almost

* *Lancet*, vol. xxxvi.

every instance a case in the room which they inhabited. Of the 757 there were only 231 reputed to be vaccinated ;* there were no means of ascertaining with regard to these the character of the vaccination, but of the whole number twenty-seven only suffered from small-pox, while of the remainder every one, who had not had previous variola, had small-pox on the occasion of this epidemic, except seven. Unfortunately Mr. Marshall did not inquire, at all events he does not state, how many had been protected by previous variola, but he mentions distinctly that there were fourteen cases of secondary small-pox. For want of this inquiry, however, his return is not available for a rigorous comparison of the relative protection afforded by variola and vaccination under these circumstances of severe exposure. It occurred to the Epidemiological Society some time ago, that valuable information might be acquired on this point by ascertaining the protection, which medical men themselves experienced from these two methods,—largely exposed as they must be to the sources of infection. Accordingly two series of inquiries were issued with the view of ascertaining this. The analysis of the second and larger series is not in such a state as enables me to make use of it on the present occasion ; but with regard to the first these are the results. Out of 347 medical men protected by vaccination there were 44, or 12.6 per cent., who had had variola subsequently, and out of 82 who had been inoculated in their infancy there were 3, or 3.6 per cent. who had subsequently small-pox. It is not for a moment to be supposed that these numbers represent the percentage in which medical men, in the ordinary practice of their vocation, are subject to variola. For, in the first place, a large number of those to whom the questions were addressed made no reply at all : now as the occurrence of variola, whether after a previous attack or after vaccination, is undoubtedly the exception, the probability is that all who had so suffered would reply, and that, conversely, of those who did not reply few or none had suffered,—and this would materially alter the percentage. In the next place, several of the cases were taken in the dissecting-room, and not in the course of practice at all ; and, lastly, it must be remembered that the persons to whom the inquiries were sent were *selected* persons, and many of them selected because of the known extent to which they were in the habit of meeting with the disease. But for comparison between the relative protective

* A remarkable proof of the extent to which vaccination was at that time glected.

powers of variola and vaccinia this return is of great value, and conclusions drawn from it may be relied on, so far as any conclusion can be relied on, which is made on so limited a number of observations: and it would appear, putting aside any reference to the special character of the vaccination, that the protective power of small-pox is considerably greater than, numerically three and a half times as great as, that of vaccination under these circumstances of great exposure. But we must bear in mind the observations that have been made with regard to efficient and inefficient vaccination; and an analysis of these cases, with the view to determine the character of the vaccination in each of them, will give us some interesting results.

Of the 347 persons there were, having

	Number.	Attacked.	Per Cent.
No cicatrix visible	18	3	16·6
One cicatrix	62	7	14·0
Two cicatrices	173	26	
Three cicatrices	36	1	3·2
Four cicatrices	20	1	
Six cicatrices	6	0	
No mention	32	6	

Of those in whom the cicatrices are mentioned as good, there were with

	Number.	Attacked.	Per Cent.
One cicatrix	48	5	12·0
Two cicatrices	158	21	
Three cicatrices	34	1	3·5
Four cicatrices	17	1	
Six cicatrices	6	0	

Now, taking these facts in connection with the immense value of the cicatrices as an index of the efficiency of vaccination, shown by the researches of Mr. Marson to which I shall allude almost immediately, they are certainly sufficiently remarkable: so far as they may be trusted to, the liability to take small-pox, in persons having more than two cicatrices of vaccination, is no greater than to take small-pox after previous small-pox: and if the observations are too few, as they undoubtedly are, to justify our drawing any positive conclusion to this effect, they require us at least to pause and to call for more facts before we acquiesce in an opposite conclusion, or admit that, duly and efficiently performed, vaccination will not protect the system, as Jenner stated, to the same extent that inoculation itself would have done.

It is a confirmation of this, that, during seventeen years, not one of the servants or nurses of the Small Pox Hospital has been attacked by small-pox, though vaccination has been the only protection of many of them.

I have endeavoured, as I have gone along, to make sufficiently clear the conclusions, which I think we may draw from the foregoing facts, with regard to the protecting power of vaccination: but I may be allowed briefly to recapitulate.

1. It would seem that there is no important difference between the protecting power of variola and vaccinia during childhood, under circumstances of ordinary exposure: with regard to severe exposure, there are not facts to determine one way or the other.

2. There are not facts to determine the relative protecting power of variola and vaccination in adults under ordinary exposure; but there are abundant proofs of the enormous amount of protection afforded by vaccinia.

3. Adults severely exposed, relying on what is ordinarily termed vaccination, will probably take small-pox, though, as we shall see immediately, of a modified kind, in a greater ratio than those having previously had small-pox, by inoculation: but

4. If the vaccination has been thorough and efficient, it is extremely probable that the liability to small-pox under severe exposure is no greater than after inoculation.

5. Those statements, therefore, are entirely without foundation, which speak of small-pox after inoculation as a risk hardly exceeding a possibility, and never to be taken into account: while small-pox after vaccination is represented as a thing of daily and constant occurrence.

6. The representation that the protection of vaccination gradually wears out, till at length it leaves the system as liable to attack as though the protection had never been imparted, is not only unproved, but is opposed to important facts, and in all probability will turn out to be unfounded.

7. There is, however, a great proclivity to small-pox, whether natural or after vaccination, between the ages of fifteen and twenty-five,—a circumstance which will account for many of the facts, which have been cited as proof of the non-durability of the vaccine protective power.

The remarkable power of vaccination in modifying the course of an attack of small-pox, and in thus diminishing the fatality of the disease, is well known to all, and admits of being estimated with very considerable precision. Of 2,654 cases of natural small-pox admitted into the Small Pox Hospital in sixteen years, in only sixty-nine was the eruption irregular or modified, and of the remaining 2,585, in 1,821 it was confluent; while of 3,094 cases reputed to be vacci-

nated it was modified in 2,149, and of the 945, in which the course was unmodified, there were but 570 confluent cases, 138 of which were in persons simply stated to have been vaccinated, but having no mark whatever, and 275 in persons having but one cicatrix. In various epidemics recorded by writers, and in others communicated to the Epidemiological Society, the result has been the same. With the view of showing at a glance the effect this modification has on the mortality of the disease, I have thrown into a table the results of observations in various epidemics at home and abroad; the results of returns made to the Epidemiological Society by practitioners residing in different parts of the country, who have kept numerical records of their cases of variola; and the observations of the Small Pox Hospital. (See next page.)

On this table I have only a few remarks to make. The returns to the Epidemiological Society will be found to present a favourable view, both as regards the mortality of natural small-pox and of small-pox after vaccination. They are from practitioners in the country as well as in towns; they include sporadic as well as epidemic cases; they do not, indeed, comprehend any *severe* epidemic in a large town; they include comparatively few hospital cases, but cases in workhouses are of course comprehended. It will be seen, then, that they are, to a great extent, free from two causes which so greatly aggravate mortality: epidemic influence and hospital aggregation. The deaths from small-pox after vaccination throughout the table are deaths after *reputed* vaccination. The statements are given as reported, and could they have been thoroughly investigated, it would doubtless appear in many instances that the evidence of vaccination was unsatisfactory: indeed, in several of the cases in which death occurred, this want of evidence is mentioned by the reporters themselves, and the same, I may remark, is the case with regard to the epidemics recorded, which stand distinct in the table from the society's returns. In the epidemic in the Mauritius, for example, where thirty deaths are recorded among 421 cases, it is expressly stated by Mr. Gardner, that in *thirteen of these deaths only* were the evidences of vaccination satisfactory; and in the returns from the Small Pox Hospital and from Ceylon the evidence of vaccination has been thoroughly investigated with very remarkable results, as we shall immediately see. The returns, however, given in the table from these sources are after *reputed* vaccination, as in the other cases. Another mode in which this table exhibits results too unfavourable to vaccination is, that except

	Natural Small-Pox.			Secondary Small-Pox.			Small-Pox after Vaccination.		
	Cases.	Deaths.	Per Cent.	Cases.	Deaths.	Per Cent.	Cases.	Deaths.	Per Cent.
Returns to Epidemiological Society	2611	515	19·7	203	17	8·3	2013	59	2·9
Edinburgh epidemic (1818-19)	205	50	24·3	—	—	—	—	—	—
Norwich epidemic (1819)	200	46	23·0	—	—	—	—	—	—
Hungerford (1838)	24	6	25	—	—	—	60	1	1·6
Gateshead	60	13	21·6	2	0	—	6	0	—
Chelsea (1838-9)	161	45	27·9	—	—	—	27	1	3·7
Wandsworth (1844-5)	58	16	27·5	—	—	—	—	—	—
Glasgow Infirmary	271	86	31·7	—	—	—	265	19	7·1
Royal Military Asylum	—	—	—	12	4	—	27	0	—
Copenhagen, five epidemics (1824-35)	746	192	25·7	—	—	—	3093	66	2·1
Wurtemburg (1831-6)	—	—	—	—	—	—	1055	75	7·1
Vienna (1834)	—	—	—	—	—	—	200	16	8·0
Malta	4850	1022	21·07	—	—	—	2720	116	4·2
Ceylon (1630)	131	58	44·2	23	2	—	260	34	13
Ceylon (1833-4)	228	88	38·5	2	0	—	197	21	10·6
Mauritius (1840-1)	281	120	42·7	—	—	—	421	30	7
Small-Pox Hospital	2654	996	35·55*	47	9	18.9*	3094	268	6·76*

* In calculating this percentage, the cases of death from superadded diseases have been subtracted, amounting, according to Mr. Marson, to 81 among the natural cases, 1 among the secondary, and 63 among the vaccinated.

as regards the Small Pox Hospital, cases of superadded disease have not been separated: thus of the fifty-nine* deaths reported in the first line, death was attributed by the reporters themselves, in several instances, to some superadded disease; in one case, to abdominal inflammation; in two to laryngitis; in one to pneumonia; in one to erysipelas; in one to scarlatina, immediately following the attack of small-pox (which last three cases all occurred in a hospital); and in one case it is stated also, that the deceased had suffered for years from chronic bronchitis. In none of these cases was the attack of small-pox itself of such a nature as would have led to a fatal result. If allowance were made, then, for these two circumstances—first, deaths included which were not properly attributable to small-pox; and, secondly, deaths in cases in which real evidence of efficient vaccination was wanting—the table would show a result still more favourable than it does to the modifying power of vaccination.

The ratio of mortality in the Small Pox Hospital is high, both as regards natural small-pox and small-pox after vaccination; much greater than prevails in communities at large even under epidemical influence, from circumstances which must be obvious. In the first place, the severer cases are those naturally sent to a hospital, the milder being kept at home; or if milder are presented when the hospital is full, the severer are taken in in preference: in the next place, there are hospital diseases, as gangrene, erysipelas, and the like, to which the patient would not have been subjected at home: and lastly, there is a hospital influence, arising from the collecting together patients all infected with such a disease as small-pox, and which, independently of the production of any special superadded disease, aggravates mortality. So it happens that, allowance being made for the superadded diseases, the mortality is still in advance of what occurs elsewhere. From the 268 deaths occurring after vaccination, Mr. Marson calculates that sixty-three should be deducted on account of superadded disease, and the rate per cent. of mortality then remaining will be 6.76 per cent.: and I must now direct attention to his masterly analysis of this mortality, constituting, as it does, the most valuable contribution which has ever been made to this branch of the subject. While the mortality, then, in all reputed to have been vacci-

* These were *all* the deaths from small-pox after vaccination, which had been seen by a hundred and seventy-one medical men who had kept records; and there were many more, who had no numerical record, but who stated to the Society that they had never seen a death from small-pox after vaccination.

nated was 6.76 per cent., in those who were *merely stated* to have been vaccinated, but had no mark to show, it was 21.73 per cent.: and it is important to remark, that the statement which was relied on here was always a clear one, either from the patient's own recollection, or from the account of his or her friends, and their belief that it had taken effect properly. In those with cicatrices it was as follows:

		Mortality Per Cent.	Mortality Per Cent.
One vaccine cicatrix:	Well marked	4·13	7·57
" "	Badly marked	11·95	
Two vaccine cicatrices:	Well marked	2·68	4·13
" "	Badly marked	7·29	
Three vaccine cicatrices:	Well marked	1·63	1·85
" "	Badly marked	2·32	
Four vaccine cicatrices:	Well marked	0·99	0·74
" "	Badly marked	0·00	
Total mortality:	With good cicatrices		3·04
"	With bad cicatrices		9·77
"	With one and two cicatrices		6·21
"	With three, four, and more cicatrices		1·30

This table is full of instruction In the first place, it shows us how many there are who consider themselves vaccinated, and in whom lymph has undoubtedly been inserted (and in most instances, probably, with some local result), and yet who have next to no protection at all. They have been vaccinated in the popular sense of the term, *but they have never gone through the vaccine disease:* and of such Jenner held and taught that they were unprotected; and yet cases and deaths, such as these, are made to swell the lists of failures of vaccination. In the same way, in the epidemic of Ceylon, in 1830, out of 64 cases with no marks there were 18 deaths; of 69 with bad marks, unlike those of proper vaccination, there were 15 deaths; but of 127 with characteristic marks, but one death. In the same way again, in the epidemic of 1833-4, in 83 cases with no marks, or bad marks, there were 19 deaths; but in 111 with good marks, but two deaths; and the same point is abundantly illustrated in the returns to the Epidemiological Society. A mere statement, then, of vaccination, however apparently clear, independently of any mark, or with very bad marks, is not much to be relied on.

It shows, in the next place, a melancholy truth,—that there is much bad and inefficient vaccination.

And lastly, it exhibits, in a most striking way, the wonderful modifying power of thoroughly good and efficient vaccination,—the mortality in those vaccinated, and having four cicatrices, being less than one per cent. under the same

circumstances, under which the mortality from natural small-pox is above 35 per cent.*

Now, it is only by taking into consideration both the protecting and the modifying power of vaccination, that we can arrive at a true estimate of the value of the discovery. Whether, when all shall be protected, small-pox shall cease from amongst us, and literally be exterminated, as Jenner anticipated, is a question which can only *then* be solved conclusively: in the meanwhile, men will settle it, probably, much according to the constitution of their minds, though there are great facts bearing upon it, and leading to a strong inference regarding it, not to be overlooked. But that, as a plague and devastating disease, as we all know it once to have been, it must already be exterminated, or that *it must be by our own fault and negligence if it be not exterminated*, seems quite clear. The means are certainly within our hands; if the result has not been attained, we must have neglected them or misused them.

Before proceeding to illustrate this by a brief reference to the change which has been induced in the mortality of mankind from small-pox, since vaccination was introduced, let me be permitted to observe, that the facts I have brought forward seem clearly to establish that vaccination is greatly to be preferred to the old process of inoculation, as a protection against small-pox, so far even as the individual is concerned, and without reference to other considerations of still greater weight, to be mentioned immediately. Vaccination involves no risk to life, and it will be seen, in the first place, how small is the chance (taking the population throughout under ordinary circumstances) that a vaccinated person will take small-pox at all, and then how very small the chance that, having taken it, he would die. But the process of inoculation itself kills outright, some of its advocates say five, and some three, of every thousand submitted to it: and for the survivors it has yet to be proved, that the protection they enjoy is greater than that afforded by vaccination, provided this be duly and efficiently performed. Of 1000 children vaccinated in infancy, it would be an extravagant supposition that fifty should ever take small-pox afterwards; and of these fifty (that is to say of the thousand vaccinated) how many would die? Why, according to the

* Of the forty-four medical men, mentioned in an earlier part of this paper as having suffered from variola after vaccination, the disease was extremely mild in all but four—so mild, in some cases, that its real character is still a matter of doubt; and in two or three there was the variolous fever merely, and no eruption.

vaccination, as we generally have it, not more than one and a half: but if the vaccination be thorough, as Mr. Marson has shown, the deaths would be less than a third even of this number. That is to say, on the extravagant hypothesis that 5 per cent. of all vaccinated should take small-pox, there would not be more than one in 2000 vaccinated who would die of small-pox at any period of their lives; whilst of 2000 inoculated, six or ten might be expected to die, as the result of the operation itself.

I have endeavoured to deal with this question as one to be settled by accumulation of facts; yet the opinions of observers,—many of whom have had large opportunities of personal inquiry and observation on the points at issue,—are not to be overlooked, especially when they are found to agree with one another in a remarkable manner. It has happened, from circumstances, that communications from nearly two thousand medical practitioners in this kingdom, from medical men in Bengal, Bombay, Mauritius, the West Indies, and various other places, have passed through my hands within the last four years: there have been, as might have been expected from such a large number of individuals, various shades of opinion as to the extent and degree of modifying or of protecting power belonging to vaccination; there have been various complaints of the way in which vaccination is often carried out; suggestions for improvement; suggestions for extension; but in no instance a suggestion that we should give up vaccination and recur to inoculation. I do not remember half a dozen instances of a personal predilection for inoculation expressed; and the communications throughout indicate an extraordinary amount of confidence in vaccination, when properly performed; none, certainly, more so than the communications from the East and West Indies. I may, therefore, be allowed to express my astonishment at reading, some time ago, in a work* purporting to be a standard work of reference, that, "in the middle of the nineteenth century, the majority of the profession, in all latitudes and hemispheres, are doubtful as to the preponderance of advantages to be obtained from inoculation or from vaccination." Dr. Copland has been publicly challenged to state the grounds of this assertion, but has never done so. There are also other statements in the same work equally incautious, unfounded, and, as tending to check the diffusion of vaccination, pernicious; as for instance, that, as regards warm climates and dark races, vacci-

* Copland's Medical Dictionary, vol. iii, p. 829.

nation has been demonstrated to be inefficacious, the correctness of which may be judged of by the returns from Ceylon and the Mauritius in the foregoing table: and again, that the law has made vaccination to supersede inoculation in warm climates and among the dark races as in this country, of which I can only say, that I hope to live to see the day when it may become true. At this present time, when the efforts of those who are striving to procure the much needed extension of vaccination are obstructed by so much idle clamour,—when such industry is manifested to revive and keep alive absurd prejudices, it is much to be lamented that any medical authority should have written with so slight a sense of the responsibility which attaches to every one who professes to be an instructor of mankind.

But while vaccination has incontestable advantages over inoculation, as regards the individual, there are other considerations which still more emphatically and urgently recommend the former practice, while they render the latter, independently of any legal prohibition, and under all circumstances where vaccine lymph is attainable, little short of criminal. The inoculated small-pox is capable, like the natural disease, of being imparted from individual to individual, and thus each inoculated person becomes a focus of contagion. In this way, during those times in which inoculation prevailed, the small-pox was constantly communicated. No fewer than twenty-three instances are given by correspondents of the Epidemiological Society, in which districts free from small-pox were infected, and the infection clearly traced to an inoculated case. This was previously to the prohibition of inoculation in England, and the good results of that prohibition are referred to by numerous correspondents. The same practice, though prohibited, goes on in Ireland at the present time with disastrous results;* and it is pointed out by the Commissioners of Inquiry appointed by the government in India, as one of the great causes of the diffusion of small-pox.† Hence it is that, during the period when inoculation was in vogue in England, there was no diminution, but rather an increase, in the mortality from small-pox; while, since the introduction of vaccination, there has been a diminution progressing year by year, as vaccination has become more and more diffused.

During the later half of the last century,‡ when inoculation

* Census for Ireland for 1851, part v, vol. i.

† Report of the Small-Pox Commissioners, etc. Calcutta: 1850.

‡ During the fifty preceding years, in which there was little inoculation, that practice having been introduced about 1720, and not become at all gene-

was practised, the mortality from small-pox, in proportion to the mortality from all causes, was for the

	Per 1000.
Ten years ending 1760 - - -	100
" " 1770 - - -	108
" " 1780 - - -	98
" " 1790 - - -	87
" " 1800 - - -	88

while the proportion subsequent to the introduction of vaccination was, for the

	Per 1000.
Ten years ending 1810 - - -	64
" " 1820 - - -	42
" " 1830 - - -	32
" " 1840 - - -	23
" " 1850 - - -	16

So also in foreign countries, the proportion of deaths from small-pox has fallen from sixty-five in the thousand, which it was during the period of inoculation, to seven in the thousand, which it is now, taking the average of a great variety of countries and a long series of years.†

The same fact may be illustrated in another way:—For the ten years ending 1800, the average annual mortality from small-pox, within the Bills of Mortality, on a population ascertained in 1801 to be 261,233, was 1780. Immediately on the introduction of vaccination, this mortality began to decline. When the Registrar-General's office was established in 1837, a thoroughly trustworthy source of information on the causes of mortality was opened; and from this authority we find that the average annual deaths from small-pox in four years, ending 1841, on the Metropolitan population, ascertained in 1841 to be 1,948,369, were only 1659; and this includes the year 1838, a year of most remarkable small-pox mortality. In 1841 the Act was passed providing public vaccination in every Union, with the result, that the average annual deaths from small-pox in fourteen years, ending 1855, on the Metropolitan population, ascertained in 1851 to be 2,373,799, were further reduced to 821.

We thus have the following results:—

	Population.	Aver. Annual Loss from Small-pox.
Ten years ending 1800 - -	261,233 - -	1780
Four years ending 1841 - -	1,948,369 - -	1659
Fourteen years ending 1855 - -	2,373,799 - -	821

rally received till the middle of the century, the average decennial ratio of deaths from small-pox to deaths from all causes, varied from 53 to 82 per 1000.

* *Vide* Report on the State of Small-Pox and Vaccination in England and Wales, and in other Countries, etc., by the Committee of the Epidemiological Society (Parliamentary Paper) 1853.

There are no records which enable me to state with accuracy the mortality from small-pox in the kingdom at large, previously to the establishment of the present system of registration; but, by distinct calculations, Dr. Lettsom and Sir G. Blane arrived at the conclusion, that the annual mortality in Great Britain and Ireland from small-pox was, during the last thirty years of last century, about 35,000: now I need not say that the whole population of Great Britain and Ireland was greatly less then than that of England and Wales is at this present time: yet the average annual mortality in England and Wales, for four years, 1838-41 inclusive, comprehending, as above, the very fatal year 1838, on a population ascertained in 1841 to be 15,914,148, was only 10,550: and, the Vaccination Act having been passed in 1841, the annual average mortality from small-pox, for seven years, 1847-53 inclusive, on a population ascertained in 1851 to be 17,922,768, was further reduced to 5,412.

These figures are extremely interesting, not only as showing the diminution of mortality from small-pox since the introduction of vaccination, but also as illustrating the value of legislative interference in diffusing the blessings of that practice.

But does this wonderful result exhibit all that vaccination is capable of effecting? If it did, we should indeed be a long way yet from the extermination of even fatal small-pox. The truth is, that of this annual aggregate of deaths, the immense majority are among those in whom vaccination has never been performed, and of whom we may safely say that, had it been performed, they would, so far as small-pox is concerned, have been alive still. Three-fourths, at least, of this mortality occurred under the age of five years: now, as death from small-pox in vaccinated children under five is of the rarest possible occurrence, there is no doubt that the whole of these, with scarcely any exception, had never been vaccinated. Of the remaining fourth, or about 1350 per ann., there are no data whatever which enable us to determine what proportion had, and what proportion had not, been vaccinated. But I do not conceive there can be any doubt that comparatively few of them had been vaccinated at all, and that still fewer had been well and efficiently vaccinated. Of 1091 deaths from small-pox, above the age of five, occurring in the course of sixteen years in the Small-pox Hospital, in only 191 was there clear evidence of vaccination, and in only thirteen out of these were there more than two cicatrices. Even of these thirteen, six died of superadded disease. I do not pretend to apply these facts rigorously to the

1350 deaths before us; but they give us some help towards a solution; and, taking them in connexion with what we have learnt above, concerning the powers of vaccination, I do not hesitate to express my belief, that the mortality now counted by thousands might speedily be reduced to hundreds, nay, even to tens, by the application of a vigorous and efficient system of public vaccination.

There is another way in which this subject may be illustrated. It is well known that there are few countries in Europe—of the countries from which I have seen returns there is not one—in which vaccination is so much neglected as, till within a recent period, it has been in this;* and the consequence is that, notwithstanding that the regulations of most of these States fall very short of a perfect system, yet in all of them the mortality from small-pox, as compared with the total mortality from all causes, is considerably less than with us. In England and Wales, on an average of the last seven years, and in London on an average of ten years, the mortality from small-pox has been fourteen out of every thousand deaths from all causes; while in Sweden, Bohemia, Venice, or Lombardy, it has not been above two.

The comparison is not honourable to our country. Yet the statement I have made presents us in the most favourable aspect, for it applies to England and Wales only, and does not take into account Scotland and Ireland, for the state of which countries our Government is equally responsible. Their condition, indeed, is almost incredible. In some towns in Scotland, as Greenock and Glasgow, the mortality from small-

* By an act passed in 1853, commonly called Lord Lyttelton's Act, it is now compulsory on the parents of all children born in England and Wales, to have them vaccinated within three months of birth. The working of this act has been most beneficial; the public vaccinations under one year of age, which were in 1851, 1852, and 1853, 186,539, 194,089, and 201,271, respectively, having risen in 1854 to 408,824, and in 1855 to 354,976; results which, having been attained without remonstrance or rebellion, show clearly, too, that there is nothing very obnoxious to the people in compulsory vaccination. In the face of such results, it may safely be affirmed that no minister would endeavour to repeal that act, and that no member of Parliament, endeavouring to do so, would meet with any success. The opponents of vaccination may safely be challenged to that issue. But there are many deficiencies in the act; and the whole administrative system, as regards vaccination, is faulty in the extreme. These deficiencies and faults are pointed out, and the requirements of a proper State provision for vaccination are suggested, in a memorial presented by the Epidemiological Society to the President of the Board of Health in 1855, and printed as a Parliamentary Paper. Much would have been done to remedy the defects existing, and to facilitate vaccination to the people, by the Government measure of last year. This was overlooked by the small and clamorous, but too successful, opposition, which opposed the Bill as a compulsory measure, but, by getting it withdrawn, left unattained all the advantages it would have secured, and compulsory vaccination still not one bit the less the law of the land.

pox has been, on an average of several years, 32 and 36, respectively, out of every 1000 deaths; and for all Ireland, during the ten years ending 1841, it was 49 per 1000, and in the province of Connaught, 60 per 1000 of the whole mortality.

The Census for Ireland, indeed, just published, for the ten years ending 1851, shows some diminution in this awful mortality; but the Commissioners expressly state their belief, that this is "in a measure owing to the general deficiency of returns for the early years over which this inquiry has extended." As it is, no less than 38,275 deaths are returned as having occurred from small-pox during this period, of which no fewer than 34,377 were under ten years of age. We may safely affirm that *the whole of these latter*, and by far the larger portion of the remainder, might have been saved by proper vaccination.

In Ireland, as I have already said, inoculation goes on. In Scotland there is no national system of vaccination. In England there is a system; and I have shown the happy results of the establishment of it, as well as the extent to which it falls short of accomplishing that which is required. Taking the state of vaccination in these kingdoms, and in the British empire generally, into account—the neglect of it, and its inefficient performance in too many instances,—and contrasting it with what may be done, and with what has been done elsewhere, I say, without hesitation, that it is a stigma upon us, and a foul disgrace, and one which must be swept away. The attention of the Legislature will soon be directed again to this subject, and it is one on which it behoves the Medical Profession to speak with no uncertain voice. If a thoroughly good system could be organised for this country, and shown to work, the extension of it to Scotland, Ireland, and the Colonies, might be looked for as a matter of course. To the establishment of this, then, let our efforts be directed; nor let the failures of the past discourage us: the cause of truth and humanity must ultimately prevail.

In publishing the foregoing essay in a periodical which is much read by non-medical men interested in questions of public health, it seems desirable to add a few words respecting eruptions, or other diseases, occurring at the time of, or immediately subsequent to, vaccination, on account of the great misapprehension which appears to exist on the subject, and of the many misstatements which have been made regarding it. These occurrences, when they have taken

place, have been cited as evidence of disease communicated to the system through the medium of vaccine lymph, and have thus been made to support a prejudice which dates from the time when vaccination was objected to, because it infected the human system with the blood of a brute,—the awful consequences of which are related in pamphlets of the period, wherein we find that in one case "the face began to resemble that of an ox," while in another there were actually to be seen "patches of cow's hair."

In the first place, it is to be observed that the occurrence of any eruption or other disease along with vaccination, or so immediately succeeding it that it can with any plausibility be connected with it, is quite exceptional. The vaccine disease, under all ordinary circumstances, runs its own definite course; and when it has subsided, the system is left in every respect in the same condition in which it was before the vaccination was effected, save only that it is free from the liability to be infected by small-pox. This fact is really so certain and so familiar to all as to require neither proof nor illustration.

Secondly, it has never been pretended that any of the diseases that have occasionally been observed at the time of, or immediately subsequent to, vaccination have a special or peculiar character; they are the same diseases as are met with in children at all periods of their existence, as arising from cold, dietetic and other causes independent of vaccination, and *especially at the period of dentition, to which time vaccination is too often deferred.*

Thirdly, it is quite obvious that the mere occurrence of such eruptions or diseases as these at the time of, or immediately subsequent to, vaccination does not constitute any proof that they have been either caused by, or that their appearance has even been in any degree promoted by, the vaccination. To establish such proof it would be needful to show, on a number of persons sufficiently large to obviate any sources of error, that these eruptions are *more frequent* in children under the influence of vaccination, than they are in children of the same age, of similar constitution, and under all the same external conditions, who are not, or who have not recently been, subjected to vaccination. It is needless to say that no exact numerical inquiry of this kind has ever been made, nor does there seem the possibility of making it, —but the following observations, made on large numbers of individuals, seem to me to show, quite conclusively, that no such increased frequency does occur. Mr. Marson, who,

since his residence at the Small Pox Hospital, has vaccinated upwards of 40,000 persons, states, "that he has never seen other diseases communicated with the vaccine disease, nor does he believe in the popular reports that they are ever so communicated. If such results were really true, as stated, and formed part of judiciously conducted vaccination, they must have come under the observation of your petitioner in vaccinating upwards of 40,000 persons."* Mr. Leese, who, in the course of his connection with the National Vaccine Establishment, has vaccinated an immense number, probably even a greater number than Mr. Marson himself, has never seen struma nor any rash of any kind produced. Mr. Marshall, late of Kington, Herefordshire, who, with his predecessor in practice, has kept an accurate register of all vaccinations performed by them from the year 1805 downwards, in 5,439 vaccinations never met with anything of the kind: and in a country district such as that in which Mr. Marshall practises, it is scarcely possible that any anomaly should have occurred without his being acquainted with it. The testimony of nearly the whole medical profession is to the same effect; and it is worthy of remark that the late Dr. Gregory, physician to the Small Pox Hospital, who was anything but an indiscriminate admirer of vaccination, did not think this question worthy of notice, but passed it by in total silence, in treating of vaccination in his work on the Practice of Physic.

There are, however, a few medical men, and they are comparatively very few, who state that, in particular cases, they have seen some eruptive or some strumous disease arising in the system so closely upon vaccination, as to excite in their minds the belief that it depended upon that process,—the vaccination, as they explain it, having acted as an irritant and roused into activity some latent constitutional peculiarity, as a cold might have done, or as the variolous inoculation, when it was practised, used in some instances to do, according to the testimony of many physicians of the last century. These gentlemen specially guard against the notion that these affections, which they associate with vaccination, are caused by the introduction into the system of any source of disease along with the lymph employed, by expressly mentioning in many instances that the same lymph used on other children developed no such affections: they

* *Vide* Mr. Marson's Petition to the House of Commons, in *Medical Times and Gazette*, August 30, 1856.

believe, in short, that the occurrence is due to the constitutional predisposition of the child vaccinated, and not to the source from which the lymph was taken. The explanation is no doubt correct *if the fact be established :* but with very great respect for those of my medical brethren who hold this opinion, I cannot but think, for reasons mentioned in the last paragraph, that what they have taken to be a consequence may have been mere coincidence, and that in constitutions such as they describe, the affections might have arisen in the same way and at the same time, had no vaccination at all been performed. But however this may be, the important practical point is, that the development of these affections is treated of as altogether an exceptional occurrence, and the fear of the possibility of inducing them has never influenced one of these gentlemen to withhold from any child the blessings of vaccination.

The foregoing facts yield, as we have seen, no support to the notion, that disease can be introduced into the system from without, through the medium of vaccine lymph. This hypothesis, indeed, is not a medical doctrine at all, but is the explanation of parents "unwilling", as Mr. Marson states, "to believe that there is anything constitutionally wrong in their offspring". All medical men well know that it is not possible to impregnate the system with any disease, except such as have a distinct and tangible materies morbi, like small-pox itself, psora, and syphilis, and then only by taking this materies morbi, and directly introducing it into the blood. Attempts to introduce diseases of other kinds—even the most contagious—have failed, though the greatest pains have been taken to secure the success of the experiment: and those who are aware that scrofulous pus has purposely been applied to the wounds made for vaccination, as well as to wounds made without any reference to vaccination, without the result of producing scrofula, can scarcely be made to believe that this contamination of the system could be effected by pure lymph taken from the arm of an apparently healthy child. For whether as regards strumous, or cutaneous disease, said by parents to be introduced into the system through the medium of the lymph employed, there is, generally, this peculiarity, that the child from whom the lymph was taken has not had the disease which he is said to impart.

In conclusion, I wish to make one or two observations on the extent to which this alleged fear of the introduction of other diseases really operates as an obstacle to the reception

of vaccination by the poorer and more untaught classes. I am quite satisfied that this has been enormously exaggerated, principally from not discriminating between the real reason for leaving a thing undone, and the alleged reason or excuse for not having done it. That the real reason for the neglect of vaccination among the poor is apathy and indifference,—conditions of mind too common amongst those whose thoughts are engrossed in procuring bread for the day,—and that there is no deeply rooted prejudice against it amongst them, seem to me to be clearly proved by the fact that they always most readily and gladly embrace it, not only under fear of impending small-pox, but whenever their attention is specially called to it by the authorities,* or whenever extraordinary facilities are afforded for having the operation performed. There is a striking illustration of this in the first year's working of the Compulsory Vaccination Act. In that year, besides 408,824 children under one year of age vaccinated in conformity with the act, there were vaccinated 290,111 above that age, to whom therefore the act did not apply, and the vaccination of whom was entirely voluntary on the part of their parents. The explanation is clear: the parents, being obliged to bring their younger children, took the opportunity to bring also the others whose vaccination they had previously neglected. Negligence, then, is the real reason, but it is one which they are ashamed to acknowledge, and they therefore, if questioned, fall back upon the excuse we have been considering, as one more likely to command respect. But though the fear of contamination is not often, as I believe, a real reason for the *omission* of vaccination, it has a more real and a very beneficial influence when it resolves itself, as it generally does, into—to use their own frequent form of expression—"a fear of bad matter": an objection which never fails to give way, when they have the assurance that there has been proper care in selecting the individual from whom the lymph was taken. Such an assurance they have an undoubted right in every instance to require; and the desire for it is not the foolish prejudice which we have been combating, but a right and reasonable feeling, which, as leading to greater caution, should be encouraged, and is encouraged by every right-minded medical man. The use of impure lymph has injurious consequences of its own, though I do not believe that it can

* See Report of the Epidemiological Society on Small-Pox and Vaccination, 1853.

convey to one child the disease of another. It may act as an animal poison, producing erysipelas and allied disorders; or it may develope local irritation, or may go on to produce spurious vesicles, affording no protection, or but imperfect protection, against small-pox. But these are events which ought really never to occur: and that which it specially imports the public thoroughly to understand is, that they are not the results of the due performance of vaccination, but the result of its improper performance; that they are perfectly avoidable; and that they constitute, therefore, a reason for care in the performance of vaccination, but no objection whatever to the operation itself.

NURSERY GOVERNMENT IN ITS SANITARY ASPECTS.

By T. HERBERT BARKER, M.D., F.R.C.S.

(*Continued from* p. 152.)

Injurious Effects of Narcotics. When the rules of infantine health are disregarded by mothers and nurses; when food wrong in quality or excessive in quantity is habitually given; when cleanliness, sufficient repose, gentle exercise and pure air have been neglected, we must expect the infant constitution to suffer. Irritation, wakefulness, a bloated or emaciated habit of body and peevishness of temper will probably appear as the results of such mismanagement. And now, as one error leads to another, the inexperienced mother or nurse, having first produced disease, proceeds to exasperate that disease by the most mischievous quackery—in short by "drugging" the infant. Its cries are distressing, it will not sleep; it is evidently suffering pain;—the pain must be allayed—the child must be put to sleep;—but what are the means to be used? Nature calls loudly for help and receives—poison! An ignorant neighbour informs the distressed mother of the wonderful virtues of a certain elixir—"Godfrey's Cordial", "Dalby's Carminative", "Poppy tea", "Diocodium and peppermint", or some other cloak for opium. In one respect these destructive nostrums fulfil their promise. The cries of the child are effectually "stilled"; for, in many cases, he is soon silent—in the grave! Let it not be thought that we write too strongly of this murderous practice. I have seen even in the course of my own experience in a rural district, too many instances of the injurious effects of narcotics upon children; but it is in the

manufacturing districts that the practice of "drugging" is carried on in a wholesale manner. On this sad topic the Registrar-General has written as follows:

"How pitiful is the condition of many thousands of children born into the world! Here, in the most advanced nation in Europe, in one of the largest towns of England,—in the midst of a population unmatched for its energy, industry and manufacturing skill—in Manchester—the centre of victorious agitation for commercial freedom—aspiring to literary culture—where Percival wrote and Dalton lived—thirteen thousand three hundred and sixty-two children perished in seven years, over and above the mortality natural to mankind! These 'little children,' brought up in unclean dwellings and impure streets, were left alone, long days, by their mothers to breathe the subtle sickly vapours—soothed by opium, a more 'cursed' distillation than 'hebenon,' and when assailed by mortal diseases—their stomachs torn, their bodies convulsed, their brains bewildered, left to die without medical aid which, like hope, should 'come to all'—the skilled medical man never being called in at all, or only summoned to witness the death and sanction the funeral!"*

Such remarks, I trust, are only required by the most ignorant mothers and nurses in the lowest grades of society. Yet I beg leave to intimate that such drugs as those referred to, may sometimes be found in the possession of nurses in the higher classes of society. The mother who wishes her infant to grow up with "a sound mind in a healthy body", cannot guard too strictly against the use of poisons.

Diet during the Second Stage of Infant Life. I have now to treat of the second stage of infancy, namely, of that beyond the sixth or seventh month, in which other articles of food may be added to the milk-diet. But let it be observed that a child will require a *gradual* weaning from its early artificial diet, as from the breast. The first deviation from a purely liquid diet may commence in the seventh or eighth month, and may consist of a little soft bread, steeped in hot water, with the addition of fresh cow's milk and a small quantity of sugar. After this has been used for some time, some light broth may be given to vary the bill of fare; but this must be free from fat and vegetable matter.

Variations of diet may be required during this second stage of infancy; but the rule of simplicity, lightness, and

* Ninth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England. 1849.

digestibility should always be observed. A diet which agrees well with one child will sometimes be found to disagree with another. Thus prepared barley dressed with water and unboiled milk will in some cases, where there is a tendency to constipation of the bowels, be found to agree well; in others it will prove too laxative. This may sometimes be obviated by boiling the milk. Or, in this case, genuine arrow-root (well cooked) may be useful. *But such articles as arrow-root, sago, or tapioca, should never be wholly depended upon as constituents of the diet of infants;* for they are deficient in some of the requisite elements of nutrition. If the infant suffer much from flatulence, it is advisable to boil a few caraway seeds in water, and carefully strain it before mixing it with the food.

The simplest deviation from the more liquid diet to which the infant had been accustomed is the bread and milk as recommended above, and this is probably the form of food liable to the least risk of error in the mode of its preparation, and should be persevered with if it is found to agree well with the infant. In order, however, to meet the requirements of different cases, a list of preparations is subjoined in the foot-note, from which it will not be difficult to make a selection suitable to almost every case.* Bear in mind this

* 1. *Bouillie* (a French preparation), commonly known in this country as *baked flour* food, may be safely recommended to mothers, as well worthy of a trial. It is made by roasting very gently the best wheat-flour in a slow oven, and afterwards boiling, or rather simmering it for a considerable time, either in water or milk and water, then adding a little sugar. When it is well made, it should be free from knots or lumps, and not too thick.

2. If the above should not agree with the infant (although it often does, if properly made) the *boiled flour* food may be tried. Take a pound of flour, put it in a cloth, tie it up tightly, then put it in a saucepanful of water, and let it boil four or five hours; then take it out, peel off the outer rind, and the inside will be found quite dry, which grate. A small quantity of this boiled flour should be made into food in the same way as gruel is made, and then slightly sweetened with lump sugar. New milk, provided it agree with the child, may be added to this preparation.

3. A French spoon-food, called *crême de pain*, may be prepared according to the following simple recipe:—Take a few slices of well-baked bread, and dry them well (but do not burn them) in an oven; then infuse them in water for several hours, and let them simmer for a considerable time, adding now and then a little more water, that the sop may not become too thick. Sweeten it moderately, and add (if you please) a few drops of orange-flower water.

4. The *lait de poule* has been referred to.

5. The farinaceous food for infants prepared by Hards of Dartford, Dodson's biscuit powder, or Lemann's preparations, may sometimes be used with advantage.

6. Bullock's semola, before referred to, is an excellent preparation, of very uniform strength, and has been found by the writer, when properly cooked according to the printed directions accompanying it, to agree remarkably well with the digestive organs of the infant. This preparation is rich in gluten,

rule:—*When you have found a diet which evidently agrees well with the child's constitution, do not, for the sake of change or to try a mere experiment, make alterations in that diet.*

Whatever the kind of food may be, let it always be prepared immediately before use, and let all the vessels used in cooking be kept perfectly clean. The food should be given to the infant at a tepid or lukewarm temperature. Until the infant is old enough to take the thicker kind of milk-sop, preference should be given to the bottle, rather than to the spoon or to the boat. The bottle should be made of colourless glass, and the form we prefer is made without the opening in the centre, and with a wide opening at one end, into which a large cork, with a well-made ivory mouth-piece piercing its centre, is fitted. I believe that this is the most convenient and cleanly apparatus. Great care should be taken to keep it very clean, or the particles of diet adhering to the inside will ferment and produce acidity. To avoid this, the most convenient way is to use two bottles, so that one may be thoroughly well cleansed, while the other is in use. Never put a second supply of food upon the remains of a former, unless a very short interval has elapsed, and they are of the same making. The tube must be kept clean;

---

the pure nutritive or flesh-making principle of wheat. One part is equal in nutritive power to five parts of wheaten flour, and it is as digestible as it is nutritious. The manufacturer's well known chemical attainments have been usefully exercised in the preparation of a really valuable article of diet, both for the infant and for the invalid.

7. The *rusk food* is very useful in some cases, and may be made with rusks, boiled for an hour with water, which should then be either strained through a sieve, or well beaten up by means of a fork, and slightly sweetened with lump sugar. Great care should be taken to select good rusks, as few articles vary so much in quality.

8. Another useful food is the top crust of a baker's loaf, boiled for an hour with water, and then moderately sweetened with lump sugar. If at any time the child's bowels should be costive, *raw* may be substituted for *white* sugar, in any of these preparations; and should *moist* sugar not answer the purpose, a small lump of *manna* may be used instead.

9. *Rice food* may be prepared in the following manner:—Soak some *best* rice in cold water for an hour; strain, and add fresh water to the rice; then let it simmer till it will pulp through a sieve: put the pulp and water into a saucepan with a lump or two of sugar, and again let it simmer for a quarter of an hour. A portion of this may be mixed with new milk, so as to make it of the thickness of cream, and should be given by means of the bottle. If the bowels are much relaxed, the milk may be boiled, but not otherwise.

10. The following is a good food, when an infant's bowels are weak and relaxed:—Into five large spoonfuls of the purest water, rub smooth one dessert-spoonful of fine flour. Set over the fire five spoonfuls of new milk, and put two lumps of sugar into it; the moment it boils, pour it into the flour and water, and stir it over a slow fire twenty minutes.

if an artificial teat be used, very great care must be taken to keep it sweet, and in the intervals between use it should be kept in a mixture of gin or whiskey and water.

Diet during Childhood. The following bill of fare may be regarded as generally sufficient for a child of two or three years. On awaking early in the morning, a little bread and milk may be given, or (while the child is too young to eat solid bread), a sop of bread in warm milk. The child will then generally sleep again for an hour or two. A second meal may consist of bread softened in hot water. The water being drained off, milk and sugar may be added. This may be taken about nine o'clock. The early meal will probably be dispensed with, if the wholesome practice of putting the child to bed early in the evening is not pursued—but if the mother wishes to rear a healthy progeny, she will by no means neglect this important point. Between one and two o'clock, or in the general dinner hour, a little broth made of the lean part of beef or mutton, or chicken-broth, with a slice of bread, will make an excellent meal. When a sufficient number of teeth show that the child is able to masticate solid animal food, a little beef or mutton plainly roasted or boiled, with such fresh vegetables as potatoes, turnips, and cauliflowers, thoroughly cooked, may be given. Until thorough mastication of the solid animal food can be performed by the teeth, it must be finely divided, in fact minced, or the child will suffer from disorder of the digestive organs and innutrition. The mother must not be satisfied with giving directions on this point to the nurse, but must see that it is properly attended to. Accustom the child to eat its food slowly, and to drink some time *after* dinner. Copious draughts during the time of eating should be avoided. This was a rule laid down by Abernethy in reference to the diet of adults, and the habit should be commenced during childhood. The best beverage for children is toast-water, freshly made. The latest meal—bread and milk—should be taken at six o'clock in the evening, not later. Soon afterwards, the child should go to bed. In the fourth or fifth year, the bread and milk may be given without water. At this age also the early meal on awaking in the morning may be discontinued.

This course of food will not suit all stomachs. Meat or broth every day would perhaps lead to fulness of the system in some. But it will be easy to observe this, and accordingly to lighten the quality and the quantity of the diet. A lightly boiled egg may occasionally be substituted with advantage for meat. *Cocoa* is a more suitable beverage for children

than tea. Ripe fruits, such as the orange, strawberries, currants, a few grapes the skins being rejected, and roasted apples, may be allowed; but stone-fruits and nuts must be avoided, also dried fruits, with the exception of figs. Whatever variations may be made, let the whole course of diet be simple, bland, and nutritious. Avoid pastry, pork, veal, salt-beef, new or heavy bread, tea-cakes, strong tea, sweetmeats, and especially (the importance of this point will bear repetition) all alcoholic beverages. That mother will show sound wisdom who keeps her children as long as possible ignorant even of the taste of ale, wine, and spirits.

To conclude; the principal rules already explained may be here recapitulated in brief terms. 1. In all normal cases, or, in other words, in all cases where no insurmountable difficulty or objection exists—the infant should be nourished in nature's own inimitable mode—*by the mother*. In this way only can we give the highest human security for the preservation of infant life and health. 2. Avoid the common error of administering medicine or indigestible food to the infant soon after its birth. 3. When the mother is not able to nurse, let the nearest and best substitute for nature's provision be found. Let the infant be committed to the care of a healthy and suitable wet-nurse. 4. In cases where it is certain that the infant can be nourished by the breast only for a very short period (say, a few weeks), and where a suitable wet-nurse cannot be engaged, it is better to give no nutriment from the breast, but, at once, to begin with the best artificial diet. 5. The process of *weaning* should be gradual, and great care must be exercised in the choice of food, according to the rules already given. 6. The artificial food of early infancy must be, in form, consistence, and quality, the nearest possible imitation of the mother's milk. 7. Give no solid food until the teeth have appeared. 8. Never depend on such articles as sago, arrow-root, or tapioca, as *main* ingredients of infantine diet. 9. The change from a liquid to a rather solid form of diet must be gradually and cautiously made. 10. Never allow either narcotics or alcoholic stimulants (*in any form whatever*) to be administered to infants or children, excepting under medical direction and care.

(*To be continued.*)

ON THE DISEASES OF COLLIERY OPERATIVES; AND THEIR PREVENTIBLE CAUSES.

By WILLIAM I. COX, M,R.C.S., etc., Corresponding Member of the Epidemiological Society.

(*Continued from* p. 43.)

In the former part of this paper, I have spoken only of the *actual diseases* to which colliery operatives are rendered liable by the nature of their employment; and the *specific causes,* as far as these are readily traceable, of the maladies arising out of their mode of labour and habits of life. But, before I proceed to the suggestion and detail of measures directed either towards the prevention and removal of such causes, or where this is not possible or practicable, their neutralisation or mitigation; it will not be out of place or foreign to the subject to devote a brief consideration to several additional circumstances, connected with the daily career of this class of operatives, over which they themselves possess little or no control—conditions and influences, universally acknowledged to be potent agents of evil; which are necessarily associated with the nature of the employment in which they are engaged, and which they are generally quite powerless to alter or avoid. Hence, the study of the really preventible causes of disease among colliers, becomes properly invested with a graver importance and a weightier claim to our interest, when it is borne in mind that there are many injurious influences at work, which we in truth *cannot avert;* circumstances which we cannot change, but which gradually impair the bodily powers, and are, as a necessary consequence, powerfully predisponent to the inroads of the maladies of which I have already spoken. It is surely fair to say that, if a man be, by the nature of his daily labour and the circumstances surrounding him, subject continually and inevitably to the operation and influence of agents unfavourable to health, it behoves him to be doubly careful to shun those causes effecting the diminution of the vital energies and the impairment of the bodily functions which he *has* the power to avoid. That these unavoidable predisposing causes of disease and direct producers of debility and general loss of tone, are by no means slight, unimportant or partial in their ultimate results, may be inferred from the indisputable fact of the early decline and mortality of colliery operatives. Even among those who otherwise lead a regular life, and are not guilty of any systematic voluntary acts tending to shorten life, premature old age is generally

apparent at the age of forty-five; and life, indeed, is rarely prolonged after sixty. It is unquestionable, that instances of longevity among pit-men are very uncommon. The characteristics of this early, and it would appear unavoidable decay and decline, will presently be more particularly described.

Of the principle of these hurtful influences, I shall first mention,

1. *Privation of Solar Light.* It is of course quite unnecessary to fill up the valuable space of this journal by any physiological argument to prove, or examples to illustrate the power, which the sun's rays (direct and refracted) possess for the maintenance of health, the prevention of disease, and also for the removal of the latter and the restoration to an integral state. The privation of solar light exercises an effect on man, precisely analogous to that which it produces on the vegetable kingdom—differing only in degree. The *plant* from which the light is excluded grows up sickly, pale, watery—its leaves nearly destitute of their natural flavour—its stalk fragile and brittle—its proper juices either perverted in nature or deficiently elaborated. *Man*, under similar circumstances, becomes also pale; and, as it were, etiolated—his complexion blanched and sallow—his limbs stunted and generally somewhat curved—his countenance heavy and listless in its expression—his blood poor, watery, deficient in albuminous constituents and in *red* corpuscles, whilst the proportion of *colourless* discs is increased (leucocythæmia, or white-cell blood). In short, the protracted exclusion of light results in a condition of vital depression, attended with increased sensibility and susceptibility to impressions—indeed, in a spanæmic state, and a general and somewhat peculiar cachexia. It must be evident to the most superficial observer, that light—especially sun-shine—is ordained by nature as a salutary stimulus, and necessary to the full and healthy performance of all the bodily functions: and that its partial abstraction for a lengthened period must be ultimately followed, if not by actual disease, at least by a systemic condition very far below par, and having a decided proclivity to various maladies.

Now, of all classes of labourers, colliers and miners are especially liable to the injurious effects of the privation of solar light; whatever these may be. During the winter months (November, December, January, and February) it may be said that they seldom see daylight; as they generally descend the pits at about four or five, a.m., not returning to the surface until the same hour p.m. And during the period of longer days and brighter weather, they are rarely above ground longer,

at most, than three or four hours before sunset. Thus, the whole year round, they enjoy very little of the light of day, and still less sunshine; excepting, of course, on the Sabbath and pay-days. And that they are cut off from the beneficial influences of sunlight and pure wholesome air, is sufficiently evidenced, not only in the prevalence among them of the diseases to which they are especially liable, but also in the bleached, sallow, unhealthy countenances, which (in accordance with the general principles above described) they present, when the extraneous dirt, with which their skin is usually loaded, is removed.

2. *The unnatural atmosphere* in which these men are compelled to labour, may perhaps be justly accounted the next fertile and inevitable source of bodily mischief, and lowering of the energies of life, to which they are subjected. This injurious atmosphere generally embraces four or five conditions, all very detrimental to health, viz.:—

a. An insufficient supply of pure air.
b. The presence of noxious gases.
c. The presence of mechanical impurities.
d. Excessive moisture.
e. Sudden and violent changes in the condition of the air.

All these conditions and circumstances of the atmospheric medium have a direct tendency to one result, viz., interference with the proper performance of the respiratory function; and, as a necessary consequence, with the depurating processes, whereby the lungs and liver preserve the purity and health of the circulating fluid and its derivatives. Frequently these conditions are all present together; and combine to produce, by their persistence in the course of time, an universal cachexia; and to lay the foundation of, and highly predispose the frame to, structural maladies of the lungs, heart, liver, and kidneys.

a. The ill effects of arts and trades, conducted in close and badly ventilated chambers, is too well known to require comment. The next condition (*b*) is, however, necessarily associated with it, in so far as respects the admixture of carbonic acid gas.

b. The deleterious admixture of gases, foreign to the constitution of the atmosphere, is a very serious and highly important evil. These noxious agents, as they exist in coal mines, consist chiefly of light carbide of hydrogen (fire-damp, $C\,H_2$); carbonic acid; sometimes sulphurous acid gas (from the pit-fires); and free hydrogen (very rare). The effect of the frequent presence of these gases in the air, is to interfere with the proper transpiration of carbonic acid gas from the pulmonary

membrane; and its consequent accumulation in the blood—to which the prevalent disorders of the cerebral circulation and organs of vision bear testimony. The particular mischievous effects of the respiration of even a minute percentage of carbonic acid in the atmosphere, are as well known at the present day (or at all events *should* be) to the general, as to the professional reader.

c. The peculiar mischief induced in the pulmonary tissue by the *inhalation of coal-dust* and other carbonaceous matters in minute solid particles, has already been described at length. (See page 40.)

d. The evil consequences of long-continued dwelling in a preternaturally *moist atmosphere*, are not quite so obvious as those already referred to. There can be small doubt, however, but that it *is* productive of much mischief, and tends, by the low temperature which it must necessarily occasion, to depress the energies, produce a species of stagnation, and seriously impede various bodily functions—particularly those of secretion and excretion.

e. The influence of abrupt and decided *changes in the chemical condition of the atmosphere*, and of *variations of temperature*, when of frequent occurrence, must ultimately be highly prejudicial to those persons subjected to them; especially when, as is commonly the case, there is utter neglect of all precaution calculated to enfeeble or neutralise their effects. The sudden shocks thus caused, affecting the delicate machinery of the air-cells, often repeated, result finally in structural lesion. And in this manner the basis is slowly, but surely, laid of the worst form of asthma (emphysematous lung); as well as of those maladies of the circulation, which follow in its train. The effects of the same transitions and changes are perhaps no less hurtful, acting as they also do through the medium of the cutaneous surface; favouring internal congestion; and quickening the development of local morbid processes in the chest and abdomen.

3. *The constrained and unpleasant postures* in which colliers are obliged to work, can scarcely fail to lead to some degree of bodily deformity, and proneness to functional and even structural derangement of some of the viscera. They are frequently compelled to labour for hours in a sitting or lying posture; and occasionally also in a cramped and painful position, in which some particular muscles are kept in a prolonged state of unnatural tension. Mention has previously been made (in my former paper) of the great probability there exists of this state of things resulting sometimes in renal, sometimes in

cardiac, disease. But its effect is more commonly and manifestly apparent in the outward conformation of colliers, and in the well known fact that the majority of them (those at least who have been trained to pit-labour from their early youth) are more or less *bow-legged;* and that large numbers of them have also slight curvature of the spine.

I may also remark, that colliery operatives are often under the necessity of pursuing their labour in localities where the water constantly reaches above the ankle—and this sometimes, day after day, for many weeks in succession. Can we, then, be surprised at the prevalence of rheumatic arthritis, bronchitis, and pleuritis, amongst men working under such unfavourable circumstances?

(*To be concluded.*)

NOTES ON CERTAIN VEGETABLE POISONS.

By WILLIAM PICKELLS, M.D., Cork.

ACONITE. Some late events have a good deal roused public attention (which seemed not to have been sufficiently awake) to the dangerous qualities of the aconite (*aconitum Napellus*); particularly the lamentable occurrence during the present year in Scotland, of the deaths of three persons (two of them clergymen) in consequence of the root being plucked in mistake for, and eaten as, horseradish. The alkaloid aconitine is, according to Dr. Taylor, "a most formidable poison, exceeding all others in its effects." Dr. Headland states: "The tenth of a grain taken into the stomach would certainly kill a man." He considers it "by far the most powerful of all known poisons." The very virulent nature of the plant was well known to the ancients, by whom it was reputed to be the "quickest of all poisons." Juvenal, in several passages, alludes to the frequent use of aconite as an instrument of secret poisoning or of assassination, it being, however, never given to the poor.

"Nulla aconita bibuntur fictilibus."

"Shall such a one," he says (Sat. 1, l. 158), "who gave aconite to three uncles, look down on us (*despiciet nos*) from his vehicle decked with pensile plumes." Virgil, in the praises he lavishes, in one of his Georgics, on the natural advantages of Italy, includes its being free from the aconite;

"Nec miseros fallunt aconita legentes",

implying that fatal accidents had often happened in those

countries in which it grew wild, from its being plucked in mistake for, and eaten as an esculent (horseradish). Unfortunately, we cannot in these islands,—though nature has done her part, the plant not being a native,—boast a like exemption; the aconite, known by the trivial name of monkshood, being extensively cultivated in gardens for ornamental purposes; hence have happened of late years (as in the instance above mentioned) those fatal results, in consequence of the root being plucked in mistake for and, served up at table, eaten as horseradish. Nor is the cultivation of aconite in gardens limited to those of the middle and affluent clssses. In this part of Ireland, but still more, I understand, in the North, it is, in numerous instances, cultivated in the gardens of small cottagers, who appear to be little aware of the danger. Children are fond of sucking the flower, tempted by the honey in the nectarium. In the last number of the *Lancet* (July 26th) is the report by Dr. Massey, of Nottingham, of the case of a small cottager, who died from having eaten, with his usual supper, a small portion of the root of the monkshood, which grew in his garden. In a former number of the *Lancet* was given the case of the child of a small cottager, living at Islesworth, whose death was occasioned by having eaten of the leaves of the monkshood which grew in the garden.*

The shores of the Black Sea were, it appears, in former times (if the stigma do not still apply), much infested by the frequency of aconite. Ovid has

"Scytheis aconiton ab oris."

The Black Sea was sometimes called the "Scythian Sea". Pliny stigmatises the port "Acone,"—200 miles from Pontus, on the eastern shore of the Black Sea, as dire (*dirus*) from the poison aconite. In the list of poisonous plants known to Dioscorides, given by Dr. Osborne, in his paper, in the *Dublin Medical Journal*, vol. xv, on the state poison of the Athenians, occurs "aconite and the honey of Heraclea in Pontus, where that plant abounds"; imparting, it would hence appear, to the honey of the place, a poisonous quality from bees feeding on the flowers.

The author of a much read popular publication of the present day (*Household Words*), attributes the poisonous quality of the Pontic honey to the abundance in the country of the rhodo-

* The melancholy death of the paymaster at Navan, near Dublin, in the early part of the present year (which excited so considerable a sensation), in consequence of the mistake at the apothecary's of tincture of aconite for tincture of chiretta, should serve as an effectual warning against entrusting implicitly the making up of medical prescriptions to tyros.

dendron. It is more probable, however, that it was owing to the abundance of the aconite. The Romans would not receive honey in tribute from the people of Pontus, but took from them, instead of it, a double quantity of wax. The abundance of poisons in Pontus, the present Natolia, is alluded to by Virgil in the eighth Eclogue.

> "Has herbas, atque hæc Ponto mihi lecta venena,
> Ipse dedit Mæris; nascuntur plurima Ponto."*

Aconite was probably the prime agent in those poisonings, which were formerly so common in the East; to the utter disregard, but too often in profligate pursuit of power, of the nearest ties of consanguinity,—the murderer, however, usually paying the forfeit of his guilt, in perishing by like treachery. "In Parthia, to have kings parricides was," according to Justin, "an almost established custom (*quasi solenne erat*)". "Phraates, not content with a share of the government, determined on the murder of his father (Orodes), and took an opportunity of administering aconite to him; but the king being afflicted with dropsy, the poison working on the disease removed the dropsical matter, and Orodes began to recover, when the diabolical son, impatient to reign without control, stifled him with his pillow!" (Lindsay's *Parthian History and Coinage*, from Plutarch, *in Crasso.*) Orodes it was who rendered the Parthian name so terrible to the Romans, by having destroyed Crassus with the whole Roman army! "Phraates, after putting to death his father, put to death" (using, probably, aconite as an instrument) "fifty brothers, sons whom his father had by different concubines; and still not stopping with sons, as he saw that the nobles, from his continual crimes, were adverse to him, he put to death every adult son who might be nominated king. In the sequel, he was himself put to death by his own son."† In the case of Alexander the Great, who died of poison in Babylon, the poison administered was, we are told by the historian, "so strong, that it could not be contained in brass, nor iron, nor shell, nor otherwise carried than in a horse's hoof."

* So constantly apprehensive was Mithridates, King of Pontus, of being poisoned, that he had recourse to an antidote composed of fifty ingredients, by the daily use of which he was said to have become poison-proof. His multifarious yet nugatory farrago retained a place, under the name of Mithridate, in the Pharmacopœia, up to nearly the end of the last century. Sinope, still retaining its ancient name, the scene of a barbarous massacre of the Turks by the Russians during the late war on the shores of the Black Sea, was the capital of Pontus in the time of Mithridates.

† While reading in the pages of Justin (from whom is the above), particularly as regards the East, the crimes perpetrated in the pursuit of power, a doubt forces itself on the mind, whether we are reading the annals of what actually happened in this world, or "the records of hell."

"Stygium" was an epithet sometimes applied to the aconite, to denote its intensity as a poison. The water of the Styx, it was said, was so poisonous, or corrosive, that it could be kept only in a horse's hoof! Hence, laying aside hyperbole, the poison given to Alexander was probably aconite. It was given to him by his cup-bearer, who had been suborned by Antipater. "Philippus et Iollas prægustare ac temperare potum regis soliti, in aquâ frigidâ venenum habuerunt, quam prægustatæ jam potioni supermiserunt."

TOXICUM. What was the nature of the poison, strictly so called by the ancients, whence our term *Toxicology*, applied to the study of poisons in general,—a study which, raised by the labours of Orfila to the rank of a science, has become so useful as subserving the ends of justice in questions of medical jurisprudence? "Venenum quoddam," says the scholiast, "dicitur Toxicon, quod Dioscorides scribit ita nominari videri ex eo, quod barbarorum sagittæ eo illinerentur." But the same scholiast adduces other reasons for the name, scilicet: "*τοξικον*, nominatum esse *φαρμακον* illud *δια το ὁμοιως τοις τοξευμασιν ἀναιρειν παραχρημα*." This etymology appears to agree with that given by the author of the article *Toxicology*, in the *Dictionary of Practical Medicine*: "from Τοξικον, venenum, itself derived from *τοξον*, a bow or arrow, by metonymy, a poison." Another etymology (drawn from fabulous history) was "Quia ex *του ἁιματος της ὑδρας ἀνεφυη ἡν τοξοις ἀνειλεν ὁ* Ἡρακλης." These different etymologies refer, it may be perceived, to the energy of the poison, or to the purpose to which it was applied, but give no insight into its real or specific nature. Pliny, xvi, 10, speaking of the yew tree, "de taxo arbore," says: "Sunt qui et taxica, hinc appellata venena, quæ nunc toxica dicimus, quibus sagittæ tinguntur"; implying, that the poison with which arrows (the points) were poisoned was taken from the yew. Ainsworth has, "Toxicum [qu. taxicum, e taxo arbore, *vide* Pliny, xvi, 10: Potius a Gr. *τοξικον*], poison."* Under "Taxeus" he quotes Florus, as saying of a certain poison, "quod venenum ex taxeis arboribus exprimitur." Cæsar informs us that Cativolcus, king of half of a people of Belgic Gaul, failing in an insurrection against the Romans, committed suicide with the yew, "exanimavit se taxo," that is, interprets the annotator, "with the juice of the yew." An ancient poet calls the yew lethal:

---

* The analogy of **τοξον**, the Greek name for a bow, to taxus, the tree of which the best bows were made, is suggestive that arrows too were made from it. Shakespeare says, "Bows of double fatal yew."

"Lethali taxo, et Scythicis medicata venenis."

The custom of the barbarians poisoning their arrows with toxicum, is alluded to by Ovid in one of his epistles from Tomi, the place of his exile, not far from the mouths of the Danube:—

"Aspicis et mitti sub adunco toxica ferro,
Et telum causas mortis habere duas."

In modern times, the poisonous qualities of the yew have been doubted by some, and even denied. In the *Treatise on Poisons* of Christison, yew poison is omitted. Sir James Smyth, in his *Flora Britannica*, speaking of the yew, says: "The leaves are fœtid and very poisonous, and prove speedily fatal to cattle, accidentally tasting them, when young and tender. The berries are not poisonous." The fatal effects of the yew on cattle were noticed so far back as the time of Dioscorides. Lindley says, "The leaves of the common yew are fœtid, and very poisonous, especially to horses and cows. The berries are not dangerous." Taylor, in his work on *Medical Jurisprudence*, gives, under the title "Yew Poison," an instance of three children who died from a tablespoonful of the fresh leaves, administered as a vermifuge; "showing," as he observes, "the fallacy of the vulgar, but erroneous notion, that the yew leaves are not poisonous when fresh, and that, in any case, they act only mechanically." He gives also the cases of three children who died from having eaten the berries; "proving," he observes, "that there is a specific poison in the yew, since it exists in the berries."

Should further inquiry confirm the supposition, that the poison known to the ancients by, strictly, the name of toxicum, was no other than yew poison, the curious fact would be revealed, that a poison, deemed in our times so doubtful as such, or insignificant, as to be omitted in the works of Christison, has given a name to the science which treats of all poisons, vegetable, animal, or mineral.*

---

* The term *intoxication*, applied to a vice, which is unfortunately the bane of some countries, is derived by Johnson from "in" and "toxicum", by Webster from "in" and "toxicum"; "which Pliny informs us is from taxus, a species of tree, in Greek σμιλαξ." Might the juice of the yew have been somehow taken advantage of for a stimulant effect of this sort, thus adding another to the various devices of man in different countries for temporarily depriving himself of the use of reason? The word "intoxicatio" does not occur in Ainsworth, the over-drinking of the nations of the South being in wine. Hence it would appear that ebriety produced by the toxicum (if the toxicum did supply a stimulant of this sort) was confined to some northern latitudes, in which the vine did not grow. The drunkenness of the Scythian nations was proverbial.

SANITARY AND SOCIAL SCIENCE.

REPORTS ON CITIES, TOWNS, & DISTRICTS.

REPORT ON THE SANITARY STATE OF THE CITY AND BOROUGH OF CANTERBURY, PARTICULARLY DURING THE YEARS 1854 AND 1855.

By GEORGE RIGDEN, M.R.C.S., Surgeon to the Canterbury Dispensary

(*Concluded from* p. 175.)

TABLE I. is intended to represent the different parishes, and portions of parishes, comprised within the boundaries of the city of Canterbury; the first fourteen on the list are included in the poor-law district of Canterbury; the 15th, 16th, 17th, and 18th are portions of parishes belonging to the poor-law district of Bridge; the remaining parishes, and parts of parishes, are united to the poor-law district of Blean.

TABLE I. *Parishes included in the City of Canterbury.*

	Inhabited houses in 1851.	Population in 1851.	Births in 1854 and 1855.	Deaths in 1854 and 1855.
CANTERBURY POOR-LAW DISTRICT.				
1. St. Mary Northgate	496	3,091	182	222
2. St. Mildred	452	2,003	119	90
3. St. Paul	341	1,729	96	121*
4. St. Alphage	238	1,098	70	55
5. St. Peter	255	1,198	68	52
6. St. Andrew	92	538	17	12
7. St. Mary Bredman	71	391	19	9
8. St. Mary Bredin	175	1,007	47	82
9. St. George	252	1,186	50	44
10. All Saints................	72	412	16	20
11. St. Margaret	108	620	16	27
12. St. Mary Magdalen........	81	413	15	9
13. St. Martin	45	189	15	11
14. Holy Cross, Westgate Within	50	225	10	6
BRIDGE POOR-LAW DISTRICT.				
15. Holy Cross, Westgate Without	159	853	44	50
16. Part of Thanington	—	158	7	3
17. „ Nackington	—	20	—	—
18. „ Patrixbourne	—	13	—	—
BLEAN POOR LAW DISTRICT.				
19. St. Dunstan..............	—	1,246	75	60
20. St. Gregory	270	1,278	91	69
21. Christ Church	38	243	4	3
22. Staplegate (extraparochial)	67	261	11	7
23. Archbishop's Palace (ditto)	32	183	2	—
24. Part of St. Stephen's	—	43	1	12
Totals	—	18,398	975	964

* During the year 1854, nine males and nine females, and during the year 1855, twenty-two males and ten females, died in the Kent and Canterbury Hospital, situate in the parish of St. Paul's, who had been brought from parishes unconnected with the city of Canterbury.

To each parish, with the exception of those of which only a portion is included in the city, and of which no separate returns could be procured, there is shown the number of inhabited houses, and population according to the last census; together with the births and deaths in the two years 1854 and 1855. In the parish of St. Mary's, Northgate, are situated the Military Barracks, containing, when the last census was taken, but 383 soldiers; whereas, during the last year, there have often been as many as 2,000 stationed there. During the year 1854, twenty-eight deaths—and in the year 1855, thirty-two deaths occurred in barracks; this has necessarily increased the number of deaths, and, in some degree, of births in that parish, in proportion to its recorded population. In the parish of St. Paul's is situated the Kent and Canterbury Hospital, having within its walls upon an average eighty-five patients. During the year 1854, twenty-nine deaths were registered as occurring in that institution, of whom eleven only belonged to the city parishes; in the year 1855 there were fifty deaths, of which eighteen only belonged to the city parishes. The deaths of those belonging to the city have been placed against the parish to which they properly belonged; but this will leave a surplus of fifty deaths occurring in the parish of St. Paul's, the subjects of which had been brought thither, in a state of disease or injury, from the neighbouring districts. It is not improbable that where the parishes are dovetailed into each other, the persons resident upon the margins are occasionally deceived as to which parish they are actually resident in; and, again, where there is no district parish church, as in Staplegate and the precincts of the archbishop's palace, it is not unusual for the more humble classes to consider themselves as belonging to St. Alphage, or to the nearest parish to the church of which they commonly attend for worship. These circumstances may have occasioned an undue number of births or deaths to become registered in such parishes in proportion to their population; but such mistakes cannot have occurred at the margins of the city as its limits are more strictly defined. Again, although it is impossible that deaths can, it is not improbable that some births escape registration; but from the general activity of our local registrars, and from the limited and almost permanent nature of our population, there is no reason to suspect that this can occur frequently, or, at all events, more frequently than in other districts. It is, however, evident that the number of births in proportion to the population, even of 1851, is ex-

ceedingly small. It is difficult to account for this unless upon the supposition that many of the citizens either join the army or navy, or emigrate into other districts just previously to attaining mature age, and this receives corroboration from the fact that in comparison with other towns there is an excess of population at young and advanced ages, and a deficiency at adult and middle ages in Canterbury. (*Vide* population tables of Canterbury and other towns, *Association Medical Journal*, July 1855.)

Table II. is intended to represent, in each month of each year, the number of births and deaths; the highest, lowest, and mean temperature; the highest and lowest points noted by the barometer; the fall of rain, in inches and 100th parts of inches; and the number of days in which the wind has blown from each point of the compass.

The law allowing parents, guardians, or householders to register a death at any time previously to burial, and a birth, without payment, at any time within six weeks of its occurrence, it frequently happens that the month of registry has not been the month in which the birth or death occurred: pains have therefore been taken in the preparation of this table to prefix each to its proper month. The atmospheric observations have all been taken at 8½ A.M. daily, as nearly as possible in the centre of the city; the highest temperature from a thermometer, placed five feet from the ground against a wall having a west aspect; the lowest temperature from a register thermometer, showing the lowest point since the last observation, placed five feet from the ground against a small tree with a south aspect; the mean temperature from the daily observation of the two thermometers. The fall of rain is noted at the same locality. The direction of the wind is noted from the vanes on the Bell Harry tower of the cathedral. "Fog" is noted when the vanes cannot be seen from that cause; "differ" when the air is calm, and the vanes at the same altitude point in different directions; and in a few days in each year, from unavoidable circumstances, no note has been made. (See next page.)

Diseases. For the purposes of this report the registers of births and deaths have been examined monthly: with respect to the latter, the cause of death has been in each case verified or corrected from the certificates supplied by the medical practitioners in attendance. The nomenclature adopted has been exactly that used upon the medical certificate; and the classification that adopted by the Registrar-General.

In the two years, 1854 and 1855, the deaths resulted from the following causes. (See page 387.)

TABLE II.

1854.	Births.		Deaths.		Temperature.			Barometer.		Rain in inches and 100th parts of inc.	Direction of the Wind.											
	Males.	Females.	Males.	Females.	Highest.	Lowest.	Mean.	Highest.	Lowest.		North.	East.	West.	South.	North-east.	North-west.	South-east.	South-west.	Fog.	Vanes differ.	Not noted.	
January	24	20	13	17	52	17	36	30·42	28·77	2·44	3	3	6	6	1	1	1	9	1	—	—	days
February	20	21	22	13	47	27	35	30·50	29·77	1·48	2	1	6	1	—	9	1	7	1	—	—	"
March	28	19	20	12	52	23	38	30·59	29·78	·63	5	3	4	3	3	—	2	11	—	—	—	"
April	14	22	16	19	58	31	44	30·40	29·50	·65	8	7	2	2	5	1	—	5	—	—	—	"
May	31	27	15	10	57	35	46	30·10	29·11	2·81	6	—	4	3	2	—	1	15	—	—	—	"
June	15	15	24	14	69	41	54	29·98	29·54	1·20	3	1	—	3	5	—	1	9	—	1	7	"
July	23	13	17	18	70	38	56	30·12	29·66	2·13	1	1	4	3	3	—	3	7	—	—	9	"
August	23	18	38	38	68	42	60	30·34	29·58	3·44	8	—	1	3	3	3	—	13	—	—	—	"
September	14	21	35	32	66	43	53	30·30	29·72	·92	3	4	3	4	4	3	3	6	—	—	—	"
October	18	16	24	21	56	33	44	30·33	29·06	5·49	1	2	4	5	2	5	1	10	—	—	1	"
November	14	27	18	17	57	27	37	30·36	28·90	2·50	4	2	9	—	3	5	3	3	1	—	—	"
December	28	22	19	11	52	28	37	30·32	29·25	2·02	—	—	15	—	—	6	—	10	—	—	—	"
											44	24	58	33	31	33	16	105	3	1	17	365
1855.																						
January	23	22	24	34	48	17	33	30·41	29·43	·78	4	7	3	1	2	5	2	7	—	—	—	
February	20	14	29	32	41	12	26	29·88	29·16	1·35	1	8	2	—	8	2	3	2	2	—	—	"
March	31	15	35	23	48	25	34	30·28	28·80	2·23	8	3	5	3	7	—	1	3	1	—	—	"
April	16	20	24	24	54	29	40	30·40	29·24	·25	6	1	6	2	8	3	—	3	—	1	—	"
May	8	22	17	19	66	32	44	29·94	29·42	2·00	8	1	6	5	5	2	1	3	—	—	—	"
June	21	17	15	17	69	42	53	30·10	29·50	1·77	1	—	5	1	1	2	1	1	—	—	18	"
July	22	19	13	14	68	49	59	30·12	29·46	2·80	1	1	9	6	3	2	1	7	—	—	1	"
August	20	13	14	14	68	49	58	30·14	29·58	1·67	2	1	7	7	—	3	1	10	—	—	—	"
September	21	19	9	9	65	38	53	30·30	29·48	·83	8	2	1	3	8	1	1	6	—	—	—	"
October	25	13	29	16	58	40	49	30·07	29·18	4·17	1	1	3	6	1	1	3	15	—	—	—	"
November	23	20	18	12	50	31	40	30·13	29·43	2·85	7	2	3	4	9	1	1	3	—	—	—	"
December	36	22	18	22	47	18	33	30·17	29·20	2·32	1	3	10	9	1	3	4	—	—	—	—	"
Totals	518	457	506	458							48	30	60	47	53	25	19	60	3	1	19	365

		Males.	Females.	Totals.
1.	Zymotic or epidemic, endemic or contagious diseases	128	117	245
2.	Diseases of uncertain or variable seat	7	17	24
3.	Tubercular diseases	68	51	119
4.	Diseases of the nervous system	59	44	103
5.	" organs of circulation	13	22	35
6.	" organs of respiration	72	53	125
7.	" organs of digestion	26	41	67
8.	" urinary organs	14	7	21
9.	" generative organs	—	3	3
10.	" organs of locomotion	3	1	4
11.	Malformation	—	2	2
12.	Premature birth	17	9	26
13.	Atrophy	10	9	19
14.	Age	47	66	113
15.	External causes	21	9	30
	No cause assigned	21	7	28

In Class 1 are included thirty-five deaths from small-pox, viz., twenty males and twenty-five females: these occurred in an epidemic extending from October 1854, to the end of the period here reported upon. With the exception of January and July, deaths are reported from this disease in each month of the year 1855. Eighteen of the deaths occurred in children under 10 years of age; two between 10 and 15 years; three between 15 and 20 years; eight between 20 and 25 years; three between 25 and 30 years; and one, a male, was between 40 and 45 years of age. Thirty-seven of the deaths in this class are reported as the result of scarlet-fever, viz., twenty-one males and sixteen females. This epidemic extended through the entire of the two years, but was most virulent during the months from July to December inclusive, in the year 1854. Thirty-four of the deaths occurred in children under 10 years of age; and one in each of the three next quinquennial periods of age. Two deaths only are reported from measles, both occurring in December 1855; they were in children under 5 years of age. Seven from hooping-cough, in children under 5 years of age; these occurred principally in November and December 1855. Two from croup and two from thrush. Twenty-one from diarrhœa, viz., nine males and twelve females; principally in September, October, and November, 1854; fourteen were in children under 10 years of age, one between 15 and 20 years, and the remainder were more than 50 years of age.

Sixty-one deaths, viz., thirty-two males and twenty-nine females, are reported as the result of cholera; one of these occurred in the Military Barracks, in January 1854; the remaining cases occurred in July, August, September, and October of the same year, with the exception of the period of be-

tween 55 and 60 years, at which age there are no deaths reported; the mortality seems very nearly equal at all other periods of life.

Ten occurred from influenza, viz., five males and five females, in the months of January, February, and March, 1855; with the exception of two children, the deaths from this disease occurred in persons more than 60 years of age. Four from purpura, in the months of April, August, and October, 1855; two of these were between the ages of 10 and 15 years of age, one between 40 and 45 years, and one between 45 and 50 years.

Fifty-one deaths resulted from fever, viz., twenty-seven males and twenty-four females, with the exception of January and June 1854, and November and December 1855, each month has produced deaths from this disease. No males between the ages of from 50 to 60, and no females between the ages of from 25 to 45, died from fever; with these exceptions no age has been exempt; but the greatest mortality was under 5 years of age and between the ages of 15 and 20 years.

Ten deaths from erysipelas, five males and five females, occurred in the months of March, October, November, and December, 1854, and April, May, October, and December, 1855; the ages of these were from 25 to 80 years.

Two males are reported to have died from syphilis, one under 5 years of age, and one between 40 and 45 years.

One female, under 5 years, in January 1854, is reported to have died from chicken-pock.

Class 2. Two males and six females died from dropsy; four males from abscess; one male and ten females from cancer; and one female from a sarcomatous tumour.

Class 3. Three males and five females died from scrofula; twelve males and six females from tabes mesenterica; fifty males and forty females from phthisis, or consumption; and three males from hydrocephalus. The deaths from the former two and the last disease were almost confined to children under 5 years of age; those from consumption occurred principally at the ages between 20 and 30 years.

Class 4. Three males and four females died from cephalitis; eleven males and twelve females from apoplexy; fifteen males and eleven females from paralysis; two males and one female from delirium tremens; four males from epilepsy; one male from tetanus; three males and three females from insanity; sixteen males and ten females from convulsions; and one male from injured spine. The deaths from convul-

sions occurred in subjects under 5 years of age; the case of tetanus between 10 and 15 years; those from apoplexy and paralysis principally between the ages of 60 and 80 years.

Class 5. One male died from pericarditis; one male and one female from aneurism; eleven males and twenty females from diseased heart; and one female from a rupture of a vessel near the heart. These deaths occurred principally in persons at ages between 55 and 75 years.

Class 6. Five males died from laryngitis; twenty-six males and twenty-eight females from bronchitis; two males and one female from pleuritis; thirty-one males and fifteen females from pneumonia; one male from asthma; and seven males and nine females from diseased lungs. The deaths from these diseases occurred principally in the months of January, February, March, and April of each year. The deaths from pneumonia principally in children; those from bronchitis at ages above 55 years.

Class 7. Five males and two females died from teething; one male from malignant tumour of the mouth; two females from stricture of the œsophagus; one male from gastritis; four males and two females from enteritis; one male and five females from peritonitis; three females from ascites; one female from hæmorrhage from the bowels; one male from tape-worm and debility; one male from diseased rectum; one female from tumour of the bowels; one female from malignant tumour of the abdomen; one male from fistula in ano; two males and two females from hernia; one male from ileus; two males and six females from diseased stomach; two males and three females from jaundice; four males and twelve females from diseased liver. With the exception of those from teething, these deaths occurred at nearly all ages, but the greater number were between the ages of from 50 to 80 years.

Class 8. Nephritis was fatal to one female; albuminuria to six males and three females; ischuria, to one male; diabetes, to two males; cystitis, to one male; diseased kidneys, to four males and three females.

Class 9. Two females died in childbirth; one female from disease of the organ of generation; the former of these were respectively between the ages from 20 to 25 years, and 40 to 45 years; the latter between 35 and 40 years.

Class 10. One male died from rheumatism; two males and one female from diseased bones.

Class 11. One female died from cyanosis; one from malformation from birth.

Class 14. Those reported to have died from age were more than 70 years old: three males and nine females were between 90 and 95 years; one male and three females were between 95 and 100 years.

Class 15. One male and one female are reported to have died from intemperance, between the ages of 25 and 45 years; one female, between 75 and 80 years, from excessive cold; one male, under five years, from poison; four males and four females from burns and scalds, five of these were under five years of age; three adult males from suicide by hanging; one female infant from suffocation; four males and one female from drowning: six males from fractures; one male, between 75 and 80 years, shot himself; and one male and one female, adults, are registered as having been feloniously killed.

The deaths, from all causes, have occurred at the following ages, viz.:—

	Under 5 yrs.	5 to 10 yrs.	10 to 15 yrs.	15 to 20 yrs.	20 to 25 yrs.	25 to 30 yrs.	30 to 35 yrs.	35 to 40 yrs.	40 to 45 yrs.	45 to 50 yrs.	50 to 55 yrs.	55 to 60 yrs.	60 to 65 yrs.	65 to 70 yrs.	70 to 75 yrs.	75 to 80 yrs.	80 to 85 yrs.	85 to 90 yrs.	90 to 95 yrs.	95 to 100 yrs.	Doubtful.	Totals.
Males ..	145	22	8	17	25	29	14	17	17	18	23	15	25	30	35	28	19	14	3	1	1	506
Females .	109	28	5	21	19	14	9	18	9	22	13	17	24	36	26	42	18	16	9	3		458
Totals..	254	50	13	38	44	43	23	35	26	40	36	32	49	66	61	70	37	30	12	4	1	964

The mortality, and the nature of the diseases producing death are, to a certain extent, the most perfect index that can be procured of the health of a city or district. And although the proportion of deaths in the city of Canterbury has been above the lowest estimate, it is yet below the average of towns and densely populated districts; and as the tables for the two years, now recorded, prove the fatality has been in a large proportion among the aged population, and in but a comparatively small proportion among persons under twenty years of age; it does not appear from the tables of mortality, that the inhabitants of this city are afflicted with any disease peculiar to the locality; and, indeed, although a large proportion of the sickness, during the last twenty years, has fallen under my observation, I have not been able to discover, nor have I heard of other practitioners discovering, one of a peculiar endemic character; the one disease more endemic than others is, doubtless, that which affects the muscular or fibrous tissues, viz., rheumatism, which, however rarely, terminates fatally, unless by

metastasis, or the induction of disease in some more vital organ, the heart being that, although comparatively rarely, most frequently so affected; and the records prove that a somewhat larger proportion of the deaths in Canterbury result from this disease, than in the country generally.

In conclusion, I have to acknowledge, in the preparation of this report, my obligations to the different local registrars through whose kindness, and with the consent of the Registrar-General, I have been enabled to examine, monthly, the records of births and deaths occurring in the city.

THE WATER SUPPLY OF LONDON.

London is now supplied with water by nine companies; five of these derive the water from the Thames; the others have special sources of supply. The first five in the subjoined list use Thames water.

Comparison of the Average Results obtained in the Analysis of Companies' Waters in 1856, *with those of the Analysis made in* 1851.

Description of Water.	Date of Taking.	Hardness.			Solid Constituents, Grains per Gallon.		
		Total.	Permanent.	Temporary.	Total solid Residue.	Organic Matter.	Inorg. Matter.
Grand Junction	1851	14·00	—	—	21·72	3·07	18.65
	1856	14·87	7·92	6·95	22·59	1·38	21·21
West Middlesex	1851	14·60	—	—	22·67	2·75	19·92
	1856	14·28	8·12	6·16	21·03	0·96	20·07
Chelsea	1851	14·44	—	—	21·28	2·38	18·90
	1856	13·80	8·63	5·17	22·79	1·42	21·37
Southwark & Vauxhall	1851	15·00	—	—	21·08	1·51	19·57
	1856	13·59	8·22	5·37	21·19	1·37	19·82
Lambeth	1851	14·16	—	—	20·40	2·59	17·81
	1856	11·98	7·82	4·16	19·84	1·33	18·51
New River	1851	14·9	—	—	19·50	2·79	16·71
	1856	13·4	7·8	5·6	21·78	0·968	20·812
East London	1851	15·00	—	—	23·51	4·12	19·39
	1856	13·98	7·53	6·45	22·05	1·09	20·96
Kent................	1851	16·00	—	—	29·71	2·61	27·10
	1856	12·03	10·1	1·93	26·10	1·37	24·73
Hampstead	1851	9·8	—	—	35·41	1·84	33·57
	1856	7·43	7·41	0·02	29·19	1·45	27·74

This table shows that the hardness of the waters in 1856 was, with one exception, somewhat less than in 1851; the diminution, however, with one or two exceptions, is only

trifling. The total amount of solid matter in the two years likewise exhibits but unimportant fluctuations.

A very considerable diminution, however, is observed in the amount of organic matter.

In fact, in 1856, the waters supplied to the metropolis contained not more than one-half of the organic matter which was present in the year 1851.

From several samples of water taken for analyses above the sources of the London supply, it was found that there was a very susceptible increase of matters in suspension in the water in its progress downwards from one point to the other, and this increase was especially noticeable after passing Windsor and Eton, two towns of which the drainage has been lately carried out to great extent, without the adoption of any means for avoiding pollution of the river.

Dr. Clark's process for softening water that is rendered hard by carbonate of lime, by the addition of more lime so as to precipitate an insoluble salt, need be considered no longer as a beautiful chemical theory, but as a plan practically carried out now for two years past at the Plumstead, Woolwich, and Charlton Waterworks, with eminent advantage and success.

The softening process is applicable with most advantage, not to river waters but to clear spring waters, such as are usually derived from wells in the chalk, or to other waters of which the hardness is derived from carbonate of lime, but which have acquired no tinge or discolouring admixture.

In this case the precipitated pure carbonate of lime is stated to possess considerable commercial value as an excellent material for whiting, which, according to Mr. Homersham's calculations, would nearly pay for the whole working expenses, and interest on the capital expended for establishing the process. The public would, in such case, enjoy all the advantages of the system almost free of cost.

If the process were applied to a water which has taken up any impurity or discolouring matter, as the water of the Thames, for instance, it is admitted that the precipitate would be valueless; but, notwithstanding this, looking at all the comfort and advantages to be derived from the use of a soft and pure water, we believe that there are few cases in which we should hesitate to recommend its adoption.—(From a Report to the Board of Health on Metropolis Water Supply. By Professor Hofmann and Mr. Blyth. 1856.)

PROGRESS OF EPIDEMICS.

LOCAL REPORTS OF EPIDEMIC AND ENDEMIC DISEASES

During the Months of September, October, and November, 1856.

Place.	County.	Lat.	Long.	Observer.
St. Mary, Scilly	Cornwall -	49.50 N.	6.18 W.	J. G. Moyle, Esq.
Teignmouth -	Devonshire -	50.32 N.	3.29 W.	W. C. Lake, Esq.
Canterbury -	Kent - -	51.17 N.	1. 4 E.	G. Rigden, Esq.
Chatham -	Kent - -	51.21 N.	0.14 E.	F. J. Brown, M.D.
Wandsworth -	Surrey - -	51.28 N.	0. 7 W.	G. E. Nicholas, Esq.
Putney - -	Surrey - -	51.28 N.	0. 8 W.	R. H. Whiteman, Esq.
Up. Holloway	Middlesex -	51.32 N.	0.03 E.	W. B. Kesteven, Esq.
Wanstead -	Essex - -	51.32 N.	0. 2 W.	F. Collins, M.D.
Swansea -	Glamorgansh.	51.38 N.	3.50 W.	W. H. Michael, Esq.
Saffron Walden	Essex - -	52. 3 N.	0.12 E.	T. Spurgin, Esq. H. Stear, Esq.
Bedford - -	Bedfordshire -	52. 8 N.	0.51 W.	T. H. Barker, M.D.
Sharnbrook -	Bedfordshire -	52.12 N.	0.40 W.	R. S. Stedman, Esq.
Newpt. Pagnell	Buckinghams.	52.10 N.	0.42 W.	G. O. Rogers, Esq.
Wellingbro' -	Northamptons.	52.20 N.	0.40 W.	B. Dulley, Esq.
Beccles - -	Suffolk - -	52.25 N.	1.48 E.	W. E. Crowfoot, Esq.
Thetford -	Norfolk - -	52.26 N.	0.45 E.	H. W. Bailey, Esq.
Dudley - -	Staffordshire -	52.30 N.	2.10 W.	J. H. Houghton, Esq.
Barrowden -	Rutland -	52.34 N.	0.38 W.	H. J. Swann, Esq.
Wisbeach -	Cambridgesh.	52.39 N.	0. 5 E.	W. H. Hole, Esq.
East Dereham	Norfolk - -	52.40 N.	0.57 E.	J. Vincent, M.D.
Pontesbury -	Shropshire -	52.43 N.	2.50 W.	Wm. Eddowes, Esq.
Nottingham -	Nottinghamsh.	52.50 N.	1.10 W.	T. Robertson, M.D.
Burton-on-Trt.	Staffordshire -	52.53 N.	1.53 W.	S. Thomson, M.D.
Oswestry -	Shropshire -	52.53 N.	2.59 W.	P. Cartwright, Esq.
Wrexham -	Denbighshire -	53. 2 N.	3. 1 W.	E. Williams, M.D.
Hawarden -	Flintshire -	53.11 N.	3. 2 W.	T. Moffat, M.D.
Lincoln -	Lincolnshire -	53.12 N.	0. 5 W.	S. Lowe, Esq.
Alford - -	Lincolnshire -	53.15 N.	0. 6 E.	R. U. West, M.D.
Staveley -	Derbyshire -	53.15 N.	1.20 W.	G. B. Thorpe, Esq.
Gainsborough	Lincolnshire -	53.23 N.	0.47 W.	D. Mackinder, M.D.
Liverpool -	Lancashire -	53.24 N.	2.59 W.	Thos. Bickerton, Esq.
Warrington -	Lancashire -	53.25 N.	2.32 W.	C. N. Spinks, Esq.
Wigan - -	Lancashire -	53.32 N.	2.33 W.	W. I. Cox, Esq.
Bolton - -	Lancashire -	53.35 N.	2.19 W.	W. H. Pendlebury, Esq.
York - -	Yorkshire -	53.58 N.	1. 3 W.	W. Procter, Esq.
Wst. Auckland	Durham -	54.45 N.	1.40 W.	G. Todd, Esq.
Rothbury -	Northumberld.	55.25 N.	1.50 W.	E. C. Summers, Esq.
Lerwick -	Shetland Isles	60. 9 N.	1. 8 W.	G. W. Spence, M.D.

QUARTERLY STATEMENT—No. VIII.

[*The dates denote that the disease appeared in the weeks then ending.*]

SCARLET FEVER.

Teignmouth..Oct. 17, Nov. 21
Canterbury..Oct. 24-31, all November
Chatham..Sept. 5-19, Oct. 10, 24-31
Wandsworth..Sept. 26, all Oct., Nov. 7, 28
Putney..November 28
Upper Holloway..September 5
Swansea..All Sept., Oct. 10-17, 31, November 14, 28
Saffron Walden..Sept. 19, Oct. 3-10, 24, Nov. 7, 21
Bedford..Sept. 12
Sharnbrook..Sept. 12-26, all October, Nov. 7-14
Dudley..Sept. 12-19, Oct. 10, 24-31, Nov. 7, 21

Wisbeach..Sept.5-12,Oct.10-31,Nov.7
East Dereham..Every week
Nottingham..Sept. 12,26, Oct. 17-24
Burton-on-Trent..October 24
Oswestry..Oct. 31, Nov. 7-21
Wrexham..Oct. 10-31, Nov. 7-21
Liverpool..Every week
Warrington..Every week
Bolton-le-Moors..Sept. 19-26, Oct. 17-
York..Nov. 21-28 [31, Nov. 21-28

MEASLES.

Teignmouth..Sept. 5, 19, all Oct.,
Canterbury..Oct. 10 [Nov. 7-14
Chatham..Sept. 12, Oct. 10, 24, Nov.
Wandsworth..Sept. 5 [7, 21
Putney..October 31, November 7
Upper Holloway..November 14-28
Swansea..September 5, 19
Bedford..Every week
Wellingborough..Sept. 26, Oct. 3-17
Beccles..October 3, 10
Barrowden district..September 5-19
Wisbeach..Oct. 17-31, all Nov.
East Dereham..November 28
Pontesbury..Sept. 5, 12, Nov. 21-28
Nottingham..Oct. 3, Nov. 14-21
Oswestry..October 10-24
Hawarden..November 21
Gainsborough..October 24, 31
Liverpool..Every week
Warrington..November 14-28
Bolton-le-Moors..Oct. 3-17, Nov. 7-21
York..September 26, October 17
West Auckland..September 5-19

SMALL-POX.

Swansea..November 28 (doubtful)
Wellingborough..Oct. 3-17,Nov.21-28
Dudley..Sept. 5, 12-26, all October, November 7, 28
Wisbeach..Oct. 17-31, Nov. 7-14
Pontesbury..Sept. 19, Oct. 17-31
Nottingham..October 3
Liverpool..Every week
Bolton-le-Moors. October 24, 31
West Auckland..September 12-26
Lerwick..Every week

HOOPING COUGH.

Teignmouth..Oct. 3, Nov. 7
Canterbury..Every week except last
Wandsworth..Sept. 26, all Oct. & Nov.
Putney..Sept. 26, all Oct., Nov. 7-14
Upper Holloway..September 5
Swansea..Every week except last
Bedford..Oct. 10-31, all Nov.
Wellingborough..November 21-28
Thetford..September 19
Dudley..October 31
Barrowden district..Sept. 26, Oct. 3,
Wisbeach..Sept. 5, 12 [24, Nov. 14
Pontesbury..Nov. 14-28
Nottingham..All Sept., Oct. 3, 10, 24, 31, November 7, 21, 28
Oswestry..Oct. 10-31, Nov. 7-21
Staveley..Sept. 19, 26, all Oct. & Nov.
Liverpool..Every week
Warrington..Every week
Bolton-le-Moors..Sept. 26, Oct. 10, 24, 31, all November.
York..Sept. 19, Oct. 3, 17, 24, Nov. 7
West Auckland..All Oct., Nov. 7-21

CROUP.

Canterbury..October 17
Chatham..October 10
Swansea..October 17
Newport Pagnell..November 21
Beccles..November 7-14
Thetford..October 17
Nottingham..Sept. 12, 19, Oct. 31, November 7-14
Wrexham..Oct. 10, 17, Nov. 14-28
Lincoln..November 7
Liverpool..Sept. 12, 26, Oct. 3, 17, 31, November 14-28
Warrington..November 21
Bolton-le Moors..Sept. 19, Oct. 17, 24
York..Sept. 12, Oct. 10-24, Nov. 14

CATARRH.

Scilly Islands..September 5
Teignmouth..Every week expt.Oct.17
Chatham..Sept. 19, 26, all Oct. & Nov.
Wandsworth..All Sept., Oct. 10, 24, November 7, 21, 28
Putney..Oct. 17, 24, all Nov.
Upper Holloway..Sept. 12, Nov. 14-28
Wanstead..Sept. 12, Nov. 14
Swansea..September 19, October 10
Saffron Walden..Sept. 12, all Nov.
Bedford..September 12, 19
Sharnbrook..Sept. 5-19, Oct. 10-31, all November
Newport Pagnell..Oct. 3, 10, 24, 31, all November [Nov.
Wellingborough..Sept. 26, all Oct. &
Beccles..Sept. 26, Oct. 3, 10, 24, 31, Nov. 21-28 [31, all Nov.
Thetford..Sept. 5, 12, 26, Oct. 10, 17,
Wisbeach..Sept.26, Oct. 3, 31, all Nov.
East Dereham..All November
Nottingham..Oct. 10, 31, Nov. 7-14
Burton-on-Trent..Oct. 10, 17, 31
Oswestry..September 5, 19
Wrexham..November 14-28
Staveley..All November
Gainsborough..Every week
Liverpool..Every week
Warrington..Sept.19,26,Oct.3,all Nov.
Wigan..Oct. 24, 31, Nov. 7-14
Bolton-le-Moors..Sept. 26, Oct. 10-31,
Rothbury..All Nov. [Nov. 14-28
Lerwick..Oct. 31, all November

INFLUENZA.

Teignmouth..Oct. 3, 31, Nov. 7
Chatham..Sept. 26, all Oct. and Nov.
Wandsworth..Sept.12, Oct.31, Nov,21
Wanstead..Sept.12-26, all Oct.& Nov.
Saffron Walden .Oct. 10, 17, all Nov.
Bedford..November 14-28
Sharnbrook..Oct. 17-31, all Nov.
Newport Pagnell..Sept. 19, 26, Oct. 17-31, all November
Wellingborough..All November
Beccles..Sept. 5, 19, Oct. 3, 17, 24
Thetford..All Sept., Oct. 3, 10, 24, 31
Dudley..Oct. 10, Nov. 14 [all Nov.
Nottingham..Sept. 5, 12, 26, Oct. 24, November 7
Oswestry..Sept. 26, Oct. 3-24
Wrexham..Oct. 24, 31, all Nov.
Hawarden..October 3
Lincoln..October 10-24
Alford..Septembe 19
Staveley..October 31, November 7, 14
Liverpool..Sept. 12, 26, Oct. 10, 31, November 14-28.
Warrington..November 14-28
Bolton-le Moors..Oct. 31, Nov. 7-21
York..Sept.12,19, Oct.10,24, Nov.7-21
West Auckland..Oct. 10-31, all Nov.
Lerwick..Oct. 31, all Nov.

ERYSIPELAS.

Scilly Islands..September 12
Canterbury..Oct. 10, Nov. 7-21
Chatham..Sept. 12, 19, Oct. 3, 10, 24, November 14, 21
Wandsworth..Sept. 19, Nov. 7
Putney..Sept. 19, 26, Oct. 3, 10
Wanstead..October 10-24
Swansea..Sept. 26, Oct. 10
Saffron Walden..September 26
Bedford..November 7-14
Sharnbrook..November 7
Newport Pagnell..Sept. 12, Oct. 10, November 14, 28
Wellingborough..Oct. 24, 31, Nov. 28
Thetford..Sept. 12, 19, Oct. 3, 31,
Dudley..Oct. 17 [Nov. 7, 14, 28
Pontesbury..All November
Nottingham..All Sept., Oct. 3, 17, November 7, 14
Oswestry..Sept. 5, 12, Oct. 10 24
Hawarden..October 31
Alford..November 14
Staveley..All Sept., Oct. 3, 10
Gainsborough..November 28
Liverpool..Sept. 12-19, Oct. 3, 17-31, November 7, 21-28
Warrington..Sept. 5, 19, 26, Oct. 17, November 14-28
Bolton-le-Moors..Sept. 26, Oct. 3, 17
York..November 21

CHOLERA.

Chatham..September 5, 19
Newport Pagnell..Sept. 19, Oct. 10
Dudley..September 5
Barrowden..Sept. 5 (English)
Liverpool..Oct. 3, 10 (English)

AGUE.

Canterbury..October 3-17
Chatham..Sept. 5-19, Oct. 3-24, Nov.
Wanstead..Sept. 5, Oct. 17 [14, 28
Bedford..October 3, November 14-28
Sharnbrook..October 31
Thetford..November 21
Barrowden..September 26
Wisbeach..Sept. 5-19, Oct. 24, 31, all
Alford..Oct. 10-31, Nov. 7-21 [Nov.
Warrington..November 14-28

REMITTENT FEVER.

Teignmouth..Sept.5,12, Oct. 3,24, 31
Wandsworth..November 7
Putney..October 17-31, November 7
Upper Holloway..September 12
Swansea..Sept. 5, 12, Oct. 10, 24, 31,
Saffron Walden..Sept. 5-19 [Nov. 7
Sharnbrook..September 5-19
Newport Paguell..Sept. 26, Oct. 10, 17, November 28
Beccles..Sept. 5, 12, Nov. 7, 21
Thetford..September 19
Dudley..September 19, October 31
Barrowden district..Sept.12-26,Oct.3
Wisbeach..Sept. 26, all Oct.
Nottingham..Sept. 5-19, Oct. 3, 24, 31, Nov. 7, 21, 28
Oswestry..Sept. 19, all Oct., Nov. 7-14
Alford..Sept. 12, 26, Oct. 3
Staveley..Sept. 12-26, Oct 3, 10
Liverpool..Sept. 12-19, Oct. 3, 17, 24,
Wigan..October 10-24 [Nov. 14 28
Bolton-le-Moors..Sept. 5, 19, 26, Oct. 24, 31, Nov. 14
York..October 24, 31, November 7
West Auckland..September 5, 12

DIARRHŒA.

Scilly Islands..September 12
Teignmouth..All Sept. and October, November 14, 28
Canterbury..Every week except last
Chatham..All Sept., Oct. 3-24, Nov.
Wandsworth..Every week [14 28
Putney..All Sept., Oct. 3-17, Nov. 21
Upper Holloway..All Sept., Oct. 3
Wanstead..All Sept., Oct. 3-24
Swansea..All Sept., Oct. 17, 31
Saffron Walden..Sept., 12 26, all Oct.,
Bedford..Every week [Nov. 21, 28
Sharnbrook..Every week expt. Oct. 31
Newport Pagnell..Every week except November 21
Wellingborough..Oct. 10-31, Nov. 28

Beccles..All Sept., Oct. 17-31, Nov. [21, 28
Thetford..Every week
Dudley..Every week except Sept. 12
Barrowden..Sept. 5-19, Oct. 10
Wisbeach..All Sept., Nov. 21, 28
East Dereham..All Sept., Oct. 17, all [Nov.
Pontesbury..All September
Nottingham..All Sept. and October, November 21, 28
Burton-on-Trent..Every week except [Nov. 7
Oswestry..All Sept., Oct. 3-24
Wrexham..Oct. 31, Nov., 7,14
Hawarden..Sept. 12-26, all Oct.&Nov.
Alford..Oct. 10-31, Nov. 7
Staveley..October 3, 10
Gainsborough..Sept. 5, 12, Oct. 17-31, all November
Liverpool..Every week
Warrington..Sept. 12-26, all Oct.
Wigan..October 31, all November
Bolton-le-Moors..Sept. 12-26, Oct. 10
Rothbury..Sept. 19, Nov. 14
Lerwick..All November

DYSENTERY.

Canterbury..November 28
Chatham..Sept. 5-19, Oct 3, 10
Putney..Sept. 12, Nov. 28
Upper Holloway..Oct. 31, Nov. 7-14
Wanstead..Sept. 5, 12, Nov. 21
Swansea..September 19
Bedford..October 3, 10
Newport Pagnell..Sept. 19, Oct. 10,17
Beccles..Oct. 24, 31, Nov. 7, 14
Thetford..November 14
Dudley..September 26
Wisbeach..Sept. 26, Oct. 3, 10
Nottingham..All Sept. & Oct.
Oswestry..September 12, 19
Gainsborough..September 5, 12
Liverpool..Sept. 12-19, Oct. 24-31, November 21-28
Warrington..All Sept., Oct. 3, 17, 24
Bolton-le-Moors..All Sept., Oct. 3, 10

TYPHUS.

Scilly Islands..November 7-21
Teignmouth..October 3, 17
Canterbury..Sept. 19, 26, all Oct., Nov. 7-21
Chatham..Sept. 5, 19, 26, Oct. 3, 10, [24, 31, Nov. 14, 21
Wandsworth..Sept. 12-26, Oct. 24, Nov. [21-28
Putney..Sept. 12, all Nov.
Bedford..All Sept., Oct. 3, 31, Nov. 7, 14
Sharnbrook..October 17
Beccles..October 31, November 7
Thetford..Sept. 12, all Oct. & Nov.
Dudley..Every week except Oct. 10
Wisbeach..All October, November 7
Pontesbury..Oct. 31, all Nov.
Nottingham..Sept. 5, 12, Nov. 14
Oswestry..Oct. 10-31, Nov. 7-21
Wrexham..November 28
Lincoln..All September, October 3
Staveley..Oct. 10, 31, all Nov.
Gainsborough..Every week
Liverpool..Every week
Warrington..September 5
Bolton-le-Moors..Sept. 5, 19, all Oct., November 14 [7, 14
West Auckland..All Sept. & Oct., Nov.
Rothbury..October 24, 31
Lerwick..October 10

PUERPERAL FEVER.

Chatham..November 21, 28
Bedford..November 21
Newport Pagnell..October 3
Dudley..September 12, 19
Nottingham..November 21
Staveley..All November
Warrington..October 17

CARBUNCLE.

Scilly Islands..October 31
Canterbury..October 31
Chatham..November 7
Putney..September 19
Wanstead..November 7
Swansea..Oct. 3, 10, Nov. 7
Saffron Walden..October 3, 31
Newport Pagnell..September 5, 12
Wellingborough..November 28
Thetford..Sept. 12, Oct. 3, 10, 24, [Nov. 14, 21
Dudley..Sept. 12
Barrowden..September 26
Burton-on-Trent..Sept. 5, Nov. 14
Oswestry..Sept. 12-26, Oct. 3-24
Wrexham..October 24, 31
Alford..November 7
Staveley..Every week
Liverpool..Oct. 17-31, all Nov.
Wigan..Sept. 19, 26, Oct. 3
Bolton-le-Moors..October 3, 10, 31

CONTINUED FEVER.

Swansea..All September

MUMPS.

Liverpool..Oct. 4 (1 case fatal)

St. Mary's, Scilly.—Mr. Moyle says: "We have had five deaths this quarter in a population of 3,600. There were no deaths in September; in which month there were only a few cases of catarrh, and one (mild) of erysipelas of the

head and face. The mean temperature for the month was 66°, and the weather very fine. The rain gauged 2·61 inches. Two deaths occurred in October; one from paralysis in an old man aged seventy-six; the other in a person aged seventy-five, from diseased heart. The case of carbuncle recovered. The weather was fine in October; the mean temperature was 60°. The rain gauged 3·29 inches. In November there were three deaths: one in an old woman aged seventy-two, from carcinoma of the breast and axilla; one in a man aged thirty-two, from phthisis; and one from typhus in a young man aged nineteen, one of a large family, living in rooms but seldom ventilated; the mother is now ill with the same disease. The weather was fine: the rain gauged 1·3 inch."

Teignmouth.—Mr. Lake writes: "From September 1st to the 8th the weather was fine, but colder than it had been at the close of August; from the 9th to the 17th it was mostly fine, warm, and pleasant; from the 17th to the end of the month it was mild, rainy, and cold; the barometer between the 22nd and 29th being continuously depressed. The first week in October was also rainy, but close and warm; from September 17th to October 6th 3·486 inches of rain fell; from October 8th to November 10th there alternated short periods of cold dry and moist warm weather; from November 11th to the 15th the weather was very cold for the time of year, but fine; from the 15th to the 28th it was fine, mild, and pleasant. Between October 9th and November 9th the barometer, on three days only, fell below 30 inches. It rained, on one day only between October 16th and November 8th. From October 16th to November 24th, the total rain fall only measured 0.446 inch. November was, throughout, a fine and bright month; on the 28th frost set in. The principal disorder of the quarter was measles. Of forty-two cases that came under my notice, nineteen were uncomplicated; in one there were convulsions; two were accompanied with pneumonia; eight with bronchitis; four with diarrhœa; three with bronchitis and diarrhœa; two with ulcerative stomatitis; one was followed by impetigo; one by lichen; and one by hooping-cough. Two deaths were registered from measles in the town during the quarter."

Canterbury.—Mr. Rigden says: "Scarlet-fever is becoming epidemic in this city and neighbourhood. Hooping-cough continues. Several cases of erysipelas, particularly affecting the head and face, have been brought under treatment. A few cases of ague have shown themselves. Diarrhœa, al-

though neither malignant nor very general, has continued to prevail. Fever has also continued; and a few cases of carbuncle have occurred. In the month of September deaths were registered as resulting from diarrhœa, catarrh, and mumps; in October from diarrhœa, scarlet-fever, and erysipelas; in November from fever, scarlet-fever, diarrhœa, and dysentery."

Mr. Haffenden furnishes the subjoined returns, drawn up by eight observers for the Epidemiological Committee of the East Kent and Canterbury Medical Society.

"*Abstract of Meteorological Observations for the Autumn Quarter*, 1856.

	Sept. Deg.	*Oct.* Deg.
Highest temperature in the day time	63	61
Lowest	47	35
Mean	54·13	51·41
Highest reading of barometer	30·16	30·39
Lowest	28·80	29·55
Mean	29·683	30·02
Number of days on which rain fell	16	12
Amount of rain in inches	3·84	2·21

Direction of the wind (the number indicates the number of days the wind prevailed)..*September*—N. 3, NE. 1, E. 3, SE. 3, S. 1, SW. 10, W. 3, NW. 6; *October*—N. 2, NE. 6, E. 7, SE. 3, S. 5, SW. 4, NW. 3.

(No return furnished for November.)

Abstract of the returns of Zymotic diseases during the Autumn Quarter, 1856.

"The number of cases which have been returned by the eight observers during the autumn quarter has been 162; and rather more than a third of these were diarrhœa.

"Scarlatina. An increase of two cases in each month has been noticed. One case proved fatal in September, it was of the malignant form. Two deaths occurred in October; one a few days after the appearance of anasarca; the other in a child three years old, who had convulsions thirteen hours after the appearance of the eruption.

"Measles, which have for some months been on the decline, seem to have disappeared altogether this quarter.

"Small-pox. Not a single case has been returned during the quarter.

"Hooping-cough furnished sixteen cases, the greater number occurring in October; only one in November; not one of them proved fatal.

"Diarrhœa. Fifty-eight cases have been reported; more than half of these were in the month of September; five only in the last month. They were chiefly ordinary cases; one was fatal; in this patient the disease continued for three weeks, never very severe, but suddenly causing great prostration, syncope, and death

"Fever shows a slight decrease this quarter. Fifteen cases have been returned, one of them ending fatally. Pneumonia being the cause.

"Ague also shows a slight decrease, five cases only being returned.

"Mumps. In September five cases were reported, and one in October. Death was the result of one, from great prostration, seven days after the commencement of the disease.

"Erysipelas and erythema. Eleven cases have been returned, all of which recovered."

Chatham.—Dr. Brown says: "Stomatitis prevailed in September, but no deaths occurred from it. Two cases of metria came under my notice in the end of November. I attribute them to paludal causes, as marsh affections have been rife throughout the quarter, and I ascertained that a connection existed between the metria that prevailed in the first quarter of 1853 and the ague class of diseases. The two cases occurred near one another, on the river side of the High-street of Rochester. It is remarkable that aguish attacks after delivery are not uncommon on this side of the street, whilst they are unknown on the opposite side. The same is the case with ague in the non-puerperal state; it affects only one side of the street. One of the cases of metria proved fatal, and was thus registered:—'child-birth,' seven and a half days; 'metria,' five and a half days. The symptoms were—rapidity of pulse, sweating, vomiting, and exhaustion. There was no abdominal complication until the last day, when there was dysuria and some pain. The second case is recovering. It consisted in mild uterine inflammation (uterine phlebitis, I believe), succeeded by pyæmia; diarrhœa was a troublesome symptom in this case. The treatment of the first case was stimulant; that of the second consisted in leeching, and the use of mercury with opium, whilst the strength was supported by wine and brandy. Both cases were attended by the same accoucheur; other women residing on the opposite side of the street, attended at the same time, even on the same day, escaped. During the past three months several cases of typhoid fever occurred, in which large quantities of blood passed from the bowels; they all recovered favourably. No case of the species typhus occurred in these towns that I myself witnessed. One case is stated to have come from London; death occurred about the eleventh day."

Wandsworth.—Mr. Nicholas says, "Scarlet-fever and hooping-cough, which commenced simultaneously towards

the end of September, have been the prevailing epidemics of the last quarter. Although diarrhœa is shown in the table to have been of weekly occurrence, the cases were isolated, and readily amenable to treatment. Many of the cases of scarlet-fever, however, commenced with diarrhœa. Scarlet-fever has now nearly subsided; but hooping-cough still continues, attacking principally infants at the breast, and the very young. From this circumstance, and its occurrence at this season of the year, the disease has had a very early tendency to the supervention of capillary bronchitis, and pneumonia. Some cases, in infants, have occurred as pneumonia primarily, its pathognomonic signs becoming developed only on the subsidence of inflammatory action. Cattle have been entirely free from epidemic disease."

Putney.—Mr. Whiteman says: "At the early part of last quarter diarrhœa of a mild form prevailed extensively in the undrained portions of this district. Hooping-cough was somewhat prevalent, but of a mild type, during the whole of October and the first two weeks of the following month. For a length of time this district has been unusually free from diseases of the zymotic class, and the rate of mortality has for months been exceedingly low. The following is an extract from one of my weekly reports to the District Board of Works, furnished in my capacity of Medical Officer of Health for this locality.

"'The last half yearly summary of sickness and mortality as given in the medical relief book of my own sub-district (Putney and Roehampton), is of a most satisfactory character: and I consider that it well illustrates the benefits resulting from improved sanitary regulations. The poor attended by me in sickness and accident, during the half year just expired (29th September), have been 363 in number. The deaths from all causes during the same period have been—from diarrhœa (ages three and eight months), 2; from infirmity of age (ages ninety-seven and eighty years), 2; from paralysis (age seventy), 1; total deaths, 5.'

"Deducting the two deaths from natural decay, the low rate of mortality here exhibited, extending over a period of six months, is somewhat remarkable, and is certainly without a parallel in the returns I have furnished during the nine years of my official connexion with the Wandsworth and Clapham Union."

Wanstead.—Dr. Collins states that the cases of influenza affected chiefly very young children.

Swansea.—Mr. Michael says: "The weather of this quar-

ter has been markedly fine, beyond the average of the season, and the public health has been also good, in an equal ratio. Although scarlet-fever has now been for many months epidemic, there have been very few severe cases; and almost every case has proceeded to a favourable termination. Hooping-cough prevails extensively, but not in a severe form."

Saffron Walden.—Mr. Spurgin says: "The quarter has been remarkably healthy, and the season generally dry. Rheumatism and neuralgic affections of the face have, however, been prevalent, particularly in October, when the weather for the season was unusually foggy. Vegetation has been protracted till a later period than usual from the absence of severe frosts."

Bedford.—Dr. Barker writes: "Measles and diarrhœa have prevailed throughout the quarter, and hooping-cough during the latter half. In many cases measles and hooping-cough have existed concurrently in the same subject, and, in some localities, measles and diarrhœa. These concurrent diseases, especially in early infancy, have proved fatal in several instances. Diarrhœa, although generally controllable, has in several cases assumed a dysenteric character. The dense fogs in this neighbourhood in the early part of November, and the frequent and sudden changes of temperature, have been followed by a large accession of disease, particularly influenza, ague, bronchitis, and neuralgic affections. Several cases of paralysis have also come under my notice. The potato is considerably diseased in many places in the neighbourhood."

Sharnbrook.—Mr. Stedman says that scarlet-fever was prevalent all the quarter, but in a very mild form. It appeared principally among the poorer classes; no fatal cases occurred.

Beccles.—Mr. Crowfoot says that mumps and neuralgia were prevalent during this quarter; cerebral congestions and apoplectic attacks were frequent in October.

Thetford.—Mr. Bailey writes: "The specific epidemics of last quarter have entirely left us, excepting one case of hooping-cough which occurred in the third week of September. Throughout the month the temperature was high, and the atmospheric pressure deviating but little, until the last ten days, when its fluctuation was great: the lowest point on the 28th being 28·80, at which time the greatest amount of rain fell. This state of temperature, together with the little wind, produced fewer diseases than usually occur at this period.

Catarrh, diarrhœa, and influenza were the most prevalent complaints. Two cases of erysipelas came under notice; their progress was arrested by the application of nitrate of silver. A fatal case of typhus gravior occurred in a lad of bad habits and delicate constitution, in a poor family; but no other case took place in the village. Remittent fever occurred in a poor man sent to the Union House from the Fens; he quickly recovered by the change of residence. During the last week of September several cases of pleurisy occurred in labouring men, arising from exposure to the wet and winds; these required very active treatment; bronchitis in children came under notice from the same cause. Rheumatism, both acute and chronic, have been generally under medical treatment, almost throughout the year; but more so within the last few days of this month. One case of carbuncle upon the loins occurred in a female; it was of large size, producing much constitutional irritation and suffering, but ultimately did well. The casual complaints during the month were—tic douloureux, menorrhagia, dyspepsia, hepatitis, dropsy, infantile convulsions, and some cutaneous diseases.

"In the early part of October, which was wet with a high temperature, overcast days and a dew point averaging the temperature, more disease occurred. Fever assuming a low type seemed more epidemic than usual, attacking families isolated from each other in different villages; several in one family were attacked at the same time. The disease commenced with some diarrhœa, which was neglected at first, producing extreme exhaustion, and followed by febrile symptoms running a long course, with various congestions: those families who were the subjects of the fever were in low circumstances, being deprived of many necessaries of life. I consider it epidemic and not infectious. In many instances only one in a large family, under the same circumstances, was afflicted; and other families at a distance, where no communication whatever took place, were attacked at the same time. In this sanitary age, cesspools, privies, bad water, etc., etc., have been supposed to be the cause of fever, but these causes have existed in the same localities for very many years, without such fever being produced. Diarrhœa was still very prevalent, and might be said to be epidemic; scarcely a day passed without a new case. One case of croup ended suddenly fatal in a child after a few hours attack. Pleurodynia was more prevalent this month, affecting suddenly those who are not exposed to the weather. Some cases of consumption, ending fatally, occurred. The casual dis-

eases were syphilis, abortion, anasarca, cancer uteri, atrophy, fistula in ano, and some cutaneous diseases.

"The great vicissitudes both in atmospheric pressure and temperature during November, especially in the last week from the excessive cold, produced many cases of pneumonia, influenza, and catarrhal affections. Diarrhœa still continued very prevalent, attacking all grades of society, and, unless early attended to, led on to consecutive fever. Erysipelas was certainly epidemic in this locality; every week produced fresh cases, attacking the face and head, and avoiding the body. In one instance a child at the breast became affected, the mother having the disease in the face. Two cases of carbuncle occurred, one in a clergyman, and the other in a tradesman, both situated at the nape of the neck; under the usual treatment both recovered. Low adynamic or typhoid fever still continued in the surrounding parishes, assuming the same type and commencing with neglected diarrhœa; this disease was confined to the very poor, several in a family being seized at the same time, and their means of support being very scanty. It was not confined to low and damp localities, but attacked those living in dry and well ventilated houses, and not holding any intercommunication. The cinchonine plan of treatment has no advantage over the ordinary mode of treatment—the disease runs its course and leaves the patient emaciated and powerless, and frequently with boils in various parts. Free ventilation has been insisted upon, with proper support by mild nutriments. Of many cases under my care, two have terminated fatally. The casual diseases of the month under notice—hæmorrhoids, syphilitic eruptions, sciatica, hydrocele, inguinal hernia (reducible), and some cutaneous diseases."

Record of Deaths in Twenty-one Parishes (*population* 9,574) *from the Registrar's Book.*

September.		*October.*		*November.*	
Diarrhœa	2	Croup	1	Consumption	5
Debility	3	Bronchitis	2	Atrophy	3
Inflammation of chest	1	Dropsy	1	Diseased bladder	1
Consumption	2	Paralysis	1	Congestion of brain	1
Atrophy	2	Diseased heart	1	Scarlatina	1
Premature birth	1	Decay of nature	3	Bronchitis	1
Congestion of brain	1	Consumption	4	Diseased heart	1
Bronchitis	1	Cancer	1	Diarrhœa	1
Decay of nature	1			Fever	2
Diseased bladder	1			Premature birth	1
Dropsy	1			Decay of nature	2
Fever	1				
Diseased liver	1				
Apoplexy	1				
	19		14		19

Dudley.—Mr. Houghton says: "Scarlet-fever has prevailed to a small extent during the last quarter. Small-pox has also prevailed throughout the quarter, and some fatal cases have occurred. Diarrhœa and fever are probably never altogether absent from the town, and will no doubt continue till the Board of Health shows more rigour than is at present manifested; on the whole, however, the quarter has been a healthy one, and the deaths have been below the average. Jaundice has occurred to a considerable extent amongst children, *not infants.* There has been but very little disease amongst cattle."

Barrowden.—Mr. Swann writes: "Measles abated at the beginning of the quarter; I have had no cases since. The fever cases were chiefly confined to Morcott; out of six cases, one died. Generally speaking, with the exception of those few cases, the district has been remarkably healthy. Within this last fortnight there has been a good deal of sore throats, coughs, and inflammations of the respiratory organs, arising from keen strong north-east and north-west winds. In the district there has also been, and still is, much disease (inflammation) of lungs among cattle. Potatoes, after the heavy rains, became much diseased."

East Dereham.—Dr. Vincent writes: "Many of the cases of scarlet-fever were rapidly fatal from coma: in comparatively few cases were the tonsils greatly affected; still fewer had abscess afterwards, but almost all suffered from dropsy; and a few died from pneumonia supervening upon the dropsy. Many of the cases (even of the most rapidly fatal) occurred in cottages of the better kind. In almost all cases the disease could be traced to communication with other families already infected."

Nottingham.—Dr. Robertson says: "The quarter has been marked by very peculiar changes in the atmosphere, which have unquestionably exerted considerable influence upon the state of the public health. September, usually one of our finest months, has this year been excessively wet; and it was most fortunate that in the south and midland counties the harvest was secured before the principal fall of rain occurred. The greatest fall occurred on the 28th (two and a half inches). It continued wet until October 16th; after which date but little rain fell to the end of the month. In November rain fell on six days, and a heavy fall of snow took place on the 26th; followed by very severe frost to the end of the month. The mean temperature of September was 2°, that of October 3°, and that of November 3° below the average. The potato crop this season is extensively dis-

eased; and root crops (especially turnips and mangel-wurzel) are expected by the farmers to suffer severely from the intense frost. Horses and cattle have suffered chiefly from diseases of the respiratory organs. Pleuro-pneumonia, of a low type, has been especially prevalent towards the conclusion of the quarter.

"The accompanying plan shows the number of deaths which occurred from epidemic and endemic diseases during the quarter; and I have also appended, by way of comparison, a similar return for the corresponding period in 1855.

	QUARTERS ENDING	
	Nov. 30, 1855.	*Nov.* 28, 1856.
Scarlet fever	2	0
Measles	0	1
Small-pox	0	0
Hooping cough	1	7
Croup	2	4
Catarrh	0	0
Influenza	0	0
Erysipelas	1	0
Cholera	0	0
Ague	0	0
Remittent fever	0	2
Diarrhœa	37	20
Dysentery	1	2
Typhus	1	5
Puerperal fever	0	1
Carbuncle	1	0

"The great percentage of deaths arising from diarrhœa is the most remarkable feature of the foregoing table; but on this subject I have not now time to enlarge, though I hope to investigate it closely at same future period. It is to be regretted that a more exact system of registration is not generally adopted, especially with regard to this disease; there is no doubt that, at present, many cases of muco-enteritis, tabes mesenterica, and other disorders, are indifferently classed together under the generic name of diarrhœa, and thus any deductions as to its causes, progress, etc., are, to a great extent, rendered impossible. For the accompanying meteorological report I am indebted to the courtesy of Mr. White.

	Sept.	*Oct.*	*Nov.*
	Deg.	Deg.	Deg.
Barometer, maximum	30·190	30·250	30·290
" minimum	29·410	29·205	29·150
" mean	29·740	29·760	29·820
Temperature, maximum	78·5	62·5	55·1
" minimum	39·5	37·2	22·1
" mean	60·1	50·7	42·5
Total amount of rain	1·9	3·05	1·02
Prevailing direction of wind	S. & SE.	S. & NW.	NW.
Mean amount of ozone (Schonbein, &c.)	8	7·5	6
Number of deaths	139	112	101
" in 1855	132	117	101

"Amongst the deaths there were two from aneurism, five from cancer, and one from natural decay, at the great age of 101."

Burton-on-Trent.—Dr. Thomson writes: "The past quarter has, generally speaking, been healthly; the most prevalent disease being diarrhœa, but seldom in a severe form. In country places there is one cause of diarrhœa about this time of the year, and, indeed, during the winter, which is not generally noticed. It is the continued use of fresh pork in a family, subsequently to the killing of a pig. After a pig has been killed, there is an unusually abundant supply of animal food, and that not in its most digestible form; consequently diarrhœa, to a greater or less extent, is so frequently consecutive, that I almost invariably put the question as to the fact, when seeing cases of the disease during the winter."

Oswestry.—Mr. Cartwright says: "The cases of remittent fever approached much to an 'intermittent,' being decidedly aguish in character. Fever of a continued kind, classed under 'typhus,' commenced, for the most part, with ulcerative stomatitis, bleeding from gums and nose, and requiring support early; *large* purpurous spots appeared in two cases. The mortality was about 1 in 12."

Alford.—Dr. West says: "I think rheumatic complaints are, and have been, unusually prevalent for several weeks. I have had several cases of apparent acute rheumatism, which have proved to be periostitis; ending in suppuration and exfoliation of bone. In one case, the knee and ankle joints were affected together, and one wrist; suppuration took place near the knee and near the ankle—the wrist escaping. I think I was enabled to trace the affection to the direct application of wet and cold. In another case in which suppuration took place on the upper part of the tibia, the patient (a little boy) died suddenly, after suffering great pain in the abdomen."

Staveley.—Mr. Thorpe says: "There have been a good many cases of fever, but of a mild character, with the exception of a few in a dirty, ill ventilated situation. I have noticed that patients have recovered but indifferently after childbirth; and two cases of puerperal fever have occurred; one a very bad case. Carbuncle has been very general for a long time. With regard to cattle, there have been many cases of milk fever in the neighbourhood. Potatoes have been very much diseased."

Gainsborough.—Dr. Mackinder writes: "The prevailing disease this season has been typhoid fever, which almost

deserves the epithet epidemic; and, though generally of a mild character, it has been fatal in a few cases. In my last report I referred to a few cases of severe typhoid which had occurred in a very circumscribed but elevated district—the southern extremity of a village four miles hence. The poor woman last spoken of died, and just before her death the mother of a large family, living in an ill ventilated cottage, a couple of hundred yards distant, was seized with the fever, and must have sunk under it had it not been for the kind and unremitting attention of a Crimean nurse, the sister of a local baronet. During the illness of this patient it was discovered that a pestilential effluvia arose from an adjoining well, which had long been the receptacle of dead dogs, cats, etc. This being closed, the fever disappeared. About a mile from the town I have had a severe case of English cholera, the secretion of urine being arrested for thirty-six hours."

The following Meteorological Report is furnished by Mr. Dyson:—"The barometrical pressure ranged very high in October, the maximum being upwards of 30.5 inches on the 25th. The lowest was 29 inches on the 23rd September. The month of October was wet, especially in the first fortnight; November generally clear and fine. The amount of rain which fell in Sept. was 2.84 inches; in Oct., 2.53 inches; and in Nov., 1.32 inches. November was remarkable for the absence, and the two preceding months for a free development, of ozone. On the night of the 23rd November, the temperature fell 20°—from 52° to 32°—and the winter set in with unusual severity at that early period, and continues up to this date (Dec. 3rd). The coldest night was the 2nd in Dec., when the *minimum* thermometer indicated 20°, and 21° the following morning at nine o'clock. Fully 6 inches of snow fell on the night of the 26th Nov.; and the greater portion remains on the ground. The highest temperature was 74° on the 1st Sept., and the lowest 20° on the 29th Nov., so that the range of temperature in the quarter was 54°."

Liverpool.—Mr. Bickerton furnishes the following statements: "Sept. 13. There has been little change in the weather, but the health of the town continues in a very satisfactory state; the deaths averaging seventy-two less than in the corresponding week of last year. There have been registered during the past seven days from scarlet fever 6 deaths; measles, 4; small-pox, 3; diarrhœa, 64; fever, 4; disease of lungs, 48; disease of brain, 9; convulsions, 1;

diseases of the stomach, 3; dentition, 4; old age and natural decay, 30.

"Sept. 27. Two hundred and forty deaths were registered during this week, being 21 more than last week. Measles caused 2; small-pox (not vaccinated), 2; typhus, 16; diarrhœa, 41; scarlet fever, 14; hooping-cough, 4; syphilis, 3; disease of lungs, 56.

"During the quarter ending September 27, 1856, 3,018 deaths have been registered in the borough, including 152 on which inquests have been held. The number is 321 less than the average mortality of the same quarter of former years, excluding epidemic cholera. Zymotic diseases caused 1,024 deaths, the average being for the same quarter of former years, without cholera, 1,080. Of this number 537 were from diarrhœa (the average being about 450); scarlet fever, 124; typhus, 90; measles, 75; hooping-cough, 55; small-pox (of which two only had been previously vaccinated), 28; dysentery, 25; tracheitis, 22; cholera, 21; syphilis, 16; and mumps, 2.

"Oct. 4. The health of the town continues satisfactory. The mortality has been 20 per cent below the average; the number of deaths registered, 192, being a smaller number than in any of the previous nine weeks. Scarlet fever caused 13 deaths; measles, 4; small-pox, 1 (not vaccinated); typhus, 11; diarrhœa, 24; cholera, 1; syphilis, 1; mumps, 1; disease of lungs, 50.

"Oct. 11. The mean temperature was $63\frac{1}{2}°$. One hundred and eighty-five deaths were registered; or 37 less than the corrected average for previous eight years. Scarlet fever caused 22 (highest for the last seven months); measles, 1; small-pox, 3 (unvaccinated); diarrhœa, 14; English cholera, 1; typhus, 7; syphilis, 2; disease of lungs, 44, including 18 from phthisis. One hundred and eleven were under the age of 5 years; eleven between 5 and 15; forty-nine between 15 and 60; fourteen above 60.

"Oct. 18. The health of the town has been favourable; 203 deaths have occurred, against the average of 221 for previous nine years. The temperature has been high during the week.

"Nov. 22. A considerable decrease has taken place in the mortality; only 192 deaths registered. Scarlet fever caused 17 deaths; measles, 5; small-pox, 3 (one only vaccinated); hooping-cough, 7; typhus, 3. Disease of lungs caused 70 deaths; 22 from phthisis pulmonalis; one-half the deaths occurred below 5 years of age, thirty-five were above 60 years old.

"Nov. 29. Two hundred and nine deaths were registered, or about the average of previous years. From scarlet fever there were 13 deaths; measles, 10; small-pox, 3 (not vaccinated); hooping-cough, 3; typhus, 6; tracheitis, 6. Diseases of lungs caused 80 deaths; 55 from bronchitis and inflammation; 20 from phthisis; 119 were males; 90 females: 111 were below 5 years old; 13 between 5 and 15; 72 between 15 and 60, and 13 above 60. Temperature very variable; highest was 53° 2′ 10″, Monday: the lowest, 31° 6′ 10″ on Saturday.

Wigan.—Mr. Cox says: "The only important cases this quarter have been those of diarrhœa. Those occurring amongst adults mostly yielded to ordinary treatment; but children (especially infants) have suffered more severely, and several have been carried off. The symptoms in many cases were those described by Rokitansky as characteristic of 'softening of the stomach.'"

Bolton-le-Moors.—Mr. Pendlebury writes: "From several sources I have ascertained that the past quarter has not been an over-busy time for the 'doctors.' Cases of typhus fever have been perceptibly fewer and milder than at this season generally. An ephemeral type of fever has been prevailing of late, and has required early tonics. The mortality amongst children suffering from pneumonia and bronchitis (which have been particularly rife) has been rather high. Hooping cough is rather on the increase. Two or three cases of small-pox have occurred in unvaccinated children, one of which was fatal. The prevailing winds have been N. and N.W., and latterly attended with a clear and frosty air in lieu of 'chill November's surly blast'; and which may account for the comparatively few cases of articular rheumatism at this time."

West Auckland.—Mr. Todd says: "During the present quarter the weather has been remarkably wet,—hardly one dry day during the whole of September and October. All the corn in this neighbourhood is unsound, and the potato disease is general and worse than in any former year. Some cases of mild remittent fever were treated during the month of September. One case of confluent small-pox occurred after vaccination. The patient, a female, aged 40, in the seventh month of pregnancy, visited a friend in Darlington, whose daughter was recovering from small-pox. Ten days after this exposure she suffered from rigors, succeeded by fever, and the eruption appeared on the twelfth day from exposure to the contagion. The patient was convalescent in

a month from the attack, and was delivered of a very healthy female child six weeks after her recovery from small-pox. Hooping cough has been very prevalent; in many cases complicated with bronchitis and pneumonia. Continued fever of a mild form—without complications, save in some instances slight gastro-enteric affection—has prevailed during the quarter. There have been no deaths—indeed the mortality from epidemic diseases has been very slight. The weather during the last month has been dry, cold, and frosty, and we have now a good covering of snow."

Lerwick.—Dr. Spence says: "The weather during the first two months of the quarter was unusually mild: the winter commenced with some severity in the beginning of November, the first snow fell on the 9th. The most important disease has been small-pox, of which there have been thirty-two cases and one death. During September it seemed to be decreasing; but in the beginning of October a person coming from Liverpool was attacked with the disease in the steerage of a coasting vessel, carrying a number of passengers, and this contributed much to the spread of the disease. In an adjoining parish there was one case of small-pox which proved fatal. There was one case of typhoid fever in October, which terminated fatally. The average age of the persons who died under medical treatment was forty-five, only one being under five. The causes of death were as follows: typhoid fever, 1; small-pox, 1; bronchitis, 1; disease of the heart, 1; chronic disease of liver, 1; debility from old age, 1."

STRAY NOTES.

Sanitary Reform. "What a yet unspoken poetry there is in that very Sanitary Reform! It is the great fact of the age. We shall have men arise and write epics on it, when they have learnt that 'to the pure all things are pure,' and that science and usefulness contain a divine element, even in their lowest appliances." (Kingsley.)

The indelicacy of imbibing impure air. Persons fond of frequenting unwholesome crowds, ought, says Trotter, to be informed, that nothing is so indelicate as to breathe *respired air*, or that exhaled from the lungs of other people: to drink of the same cup is the height of politeness compared with this custom.

SANITARY LEGISLATION.

DRAINAGE OF THE METROPOLIS.

Not much has been done in this direction during the past quarter, except a great deal of noise and numerous interchanges of words between the Metropolitan Board of Works and Sir Benjamin Hall. Sir Benjamin has acted with great prudence and decision. He appoints a competent committee to receive all drainage schemes, and report on them. We have in hand numerous letters and communications on various drainage plans; but as we do not see any plan that is free from objection, or is at once simple and effective, and as all the plans have been discussed to tiring point by the scientific journals, we have, *pro tem.*, but little to say. Mr. Nicholas, of Wandsworth, has placed before us some very sound views on the general question of a drainage scheme. He sees the necessity of commencing the flushing process from each house. To leave our drainage and sewerage in the present state, and to be content to open only one immense general sewer for the reception of the tributary sewerage now thrown into the Thames, must, in a sanitary point of view, argues Mr. Nicholas, be a failure. We believe he is right.

HEALTH OF CROYDON.

The Board of Health, having addressed some inquiries to the Medical Officer of Health for Croydon, respecting the mortality and health of the inhabitants of that district, received an answer from Mr. Bottomley, to whom the letter went by mistake, as there is no medical officer of health in Croydon. Mr. Bottomley gave a very dismal history of the sanitary state of his district. Hereupon the Local Board of Health met, repudiated Mr. Bottomley's statements, declared that he had no authority to answer the letter, and drew up a report from the evidence of various medical men, ministers, and residents of the locality, proving that the town is in a healthy state, and that the new drainage system works exceedingly well. It is fair to say, that these inquiries on the part of the Local Board seem to have been conducted with impartiality and justice, and that Croydon is really improved in its sanitary resources.

ANNUAL REPORT OF THE REGISTRAR-GENERAL.

The Registrar-General has brought out his Seventeenth Annual Report, containing a letter from Dr. Farr, which is, as usual, full of valuable and interesting matter. In 1854, not fewer than 113,576 persons died of zymotic diseases. The fatality stands in the following order: deaths in 10,000 living; cholera, 11; diarrhœa, 11; scarlatina, 10; typhus, 10; hooping-cough, 5; measles 5; croup, 2; small-pox, 1·5; dysentery, 1; erysipelas, 1. The letter goes to substantiate the view as to the propagation of cholera by impure water.

REPORT ON MILITARY PRISONS.

Lieutenant-Col. Jebb has brought out a report, which is satisfactory, in respect to the health of military prisoners. Since 1850, a reduced diet has rather improved the health of the men than otherwise. Here is the scale:—

	Ordinary.			*After* 84 *Days.*	
Breakfast	Oatmeal	8 oz.	....	Oatmeal	10 oz.
Dinner ..	Indian meal .	9	....	Indian meal .	12
Supper ..	Bread	8	....	Bread	8

With half a pint of milk to each meal. This diet leads to loss of bodily weight, but to less sickness. Like all these prison documents and modern preachments about model plans of treating prisoners, this Report is hopelessly superficial and unnatural. If prison-reform, so called, has to rest on "model discipline," so called, then Heaven, or a revolver, protect us from liberated prisoners. We do not often argue in poetry, but Wordsworth has a song so moulded to our hands, that we use it without hesitation:—

"This is the process of our love and wisdom!
To each poor brother who offends against us,
Most innocent, perhaps,—and what if guilty?
Is this the only cure?
. . . . . . '*Uncomforted*
And friendless solitude!' . . .
With other ministrations thou, oh Nature!
Healest thy wandering and distempered child.
Thou pourest on him thy soft influences,
Thy sunny hues, fair forms, and, breathing sweets,
Thy melodies of woods and winds and waters,
Till he relent, and can no more endure
To be a jarring and dissonant thing
Amid this general dance and minstrelsy;
But, bursting into tears, wins back his way,
His angry spirit healed and harmonized
By the benignant touch of love and beauty."

TRANSACTIONS

OF THE

EPIDEMIOLOGICAL SOCIETY

OF LONDON

FOR THE YEAR 1856.

LONDON:
T. RICHARDS, 37, GREAT QUEEN STREET.

M.DCCC.LVII.

INDEX.

TRANSACTIONS

OF THE

EPIDEMIOLOGICAL SOCIETY OF LONDON.

Papers and Communications.

A PROPOSITION TO SUPPLY THE LABOURING CLASSES WITH NURSES IN THE TIME OF EPIDEMIC AND OTHER SICKNESSES.

By EDWARD H. SIEVEKING, M.D., F.R.C.P.

[*Read before the Epidemiological Society*, April 3rd, 1854.*]

It is a point upon which probably all who have had much intercourse with the lower orders of society will agree, that illness is comparatively a much severer infliction upon them, than it is upon the members of those classes who do not live from hand to mouth; for this reason, that it immediately affects their means of obtaining a livelihood, and encroaches

* In consequence of the present paper, the Epidemiological Society appointed a committee to consider the plan proposed in it. Certain modifications have been made in the manner by which the scheme is proposed to be realised; but the committee have recently resolved that it is expedient to publish the original paper, in order more fully to show the arguments by which they have been influenced. The Earl of Shaftesbury has pledged himself to the committee to support their scheme; and as only an order from the Poor-law Board is requisite to carry it into effect, the committee earnestly hope that the labours of two years may soon be crowned with success. The committee, in addition to the testimony of medical men, can bring forward numerous masters of workhouses to prove that their scheme is not only theoretically good, but practically perfectly feasible. Without this explanation it would be difficult to understand the apparent discrepancies between the writer's statements and the propositions adopted by the committee, which were published in the Transactions of the Epidemiological Society for April 1855.

upon their daily income. The absence of providence among the working classes is a frequent subject of declamation; but in numerous instances, in which a proper forethought and due thrift had been exercised, the calculations are set at nought by the inroads of disease. The actual outlay occasioned by sickness is no less a serious difficulty than the consequent loss of employment; a loss that may be temporary, but very probably becomes permanent. The savings, if any, soon evaporate under the pressure of disease. When the savings are gone, and no new resources have been opened in the interval—and, unless by a *deus ex machinâ*, where are they to come from, when work is at a stand still?—the pawnbroker's shop yawns to receive its victims, and henceforward we see but a downward ruin. The hardest case is undoubtedly the one immediately alluded to, where the head of the family is prostrated by sickness. The argument applies more or less to the occurrence of illness in any member. If it is the mother, the domestic concerns are not attended to—the father comes home to discomfort, anxiety, and turmoil; if the child or children, the mother's strength is taxed beyond what she can bear, and in too many instances she loses health, though she may not be a direct loser of a daily income—and she, too, is cast upon the sick-bed. Medical men and clergymen can bear witness to the fact, that disease spreads among the labouring classes, in a degree entirely disproportionate to the influence of sanitary relations. No one is inclined to estimate these at a higher value than I am; but, assuming all hygienic demands to be satisfied, in regard to sewerage, watering, drainage, and ventilation, it is maintained, that there still remains an amount of removable, or rather preventible disease, for which other remedies must be sought than those offered by the most perfect sanitary laws.

These convictions were forced upon me at a time when, as physician to a metropolitan dispensary, I was in the daily habit of visiting the sick poor at their own homes; when I had constant opportunities of observing how closely the well-being of families depended upon the health of the individual members; and how frequently the gradual and progressive ruin of a family was connected with, and traceable to, the first appearance of disease at their doors. It is more particularly to the political economist that the fact should be a subject for earnest and serious reflection; for the loss of health in the working man is a loss to the community—indirectly, by deprivation of his labour; directly, by the cost entailed. This fact is most sensibly brought home to us by our poor and

county rates. We are not, it is unfortunately true, rated for our hospitals; but the amount of poor-rates is enormously swelled, indirectly as well as directly, by the amount of disease preventible in the manner alluded to. The illness that commences by diminishing and arresting the daily supplies, terminates its career by throwing its victims on the parish for maintenance or for burial.

An instance will best explain these observations. Not long since, I was induced to visit the domicile of a patient who was under my care at St. Mary's Hospital, as an out-patient. He was a respectable, hard-working man, a coach painter; he was labouring under rheumatism of the extremities, and was unable to handle his brush, and therefore to earn the bread for the subsistence of his family. I found him surrounded by four young children, the youngest a baby; his wife had been previously taken ill, and was obliged to resort to a hospital. The man himself, left in sole charge of four young children, had to work by day, and nurse his tender offspring by night. Was it surprising that his overwrought constitution sunk under the accumulating anxiety and stretch of body and mind? He followed his poor wife to an early, and, as far as human eye could reach, unmerited grave; and the four children became the recipients of parish relief, the inmates of a workhouse. Here there was no hygienic measure at fault, in the medico-legal sense; and yet it was a case where, in the most vulgar and lowest sense, it was the interest of the community to have prevented the fatal issue. Is it necessary to calculate in £ *s. d.* the cost to the parish of this unhappy family—the burial of two parents, the prolonged maintenance of four children—in order to prove that proper assistance, rendered at the outset of disease, would in all probability have prevented much misery, and have saved a large sum of money to the community?

The instance to which I have alluded may be regarded as exceptional; but this is erroneous. I select it merely because it occurred recently, and because it happens to illustrate particularly well the point to which I am anxious to draw attention—the means of preventing or arresting the inroads of disease among the working classes, by supplying them with nurses. In providing such assistance, it is not intended to establish substitutes for the present medical attendants, in the guise of female doctors; but to secure the efficient execution of the directions given by the medical man, and thus materially to aid his labours. This would form another important element in preventive medicine;

b 2

while the presence of a nursing attendant in the sick-chamber would obviate the necessity which now exists of a constant intercourse between the neighbours and the sick—the proof of much kindly feeling, but also a fertile source of disease by contagion. The nurse would therefore be a direct benefit, not only to the house or family affected, but also to the immediate neighbourhood.

The preceding remarks have not been directed towards exciting philanthropic commiseration with the sick poor, but are made mainly with a view to showing that it is the immediate interest of the higher classes, and of the governing bodies, to provide a remedy for evils which, directly or indirectly, affect themselves. It is confessedly low ground to take; but it is the only ground upon which it would be possible to secure that extensive and uniform co-operation, which, if the views expounded are correct, and the scheme to be proposed any way feasible, must be brought to bear. The advantages obtainable by an early arrest of disease among the lower orders have of late been palpably illustrated, by the beneficial results yielded by the house-to-house visitation in districts in which epidemic cholera had made its appearance. Here we have a casual and terrifying calamity arrested, by a measure as temporary as the inroads of the enemy; but we need only turn to the Registrar-General's reports, and the returns of the Health of Towns Commission, to convince ourselves that a vast proportion of all endemic and epidemic disease, and a fearful mortality, might be prevented, and their consequences obviated, by similar provisions, not of a temporary, but of a permanent character. I trust I may not be accused of making vague statements, if I appeal rather to the personal experience of individual medical men, clergymen, and others, than to statistics, in order to prove my position regarding the pecuniary saving necessarily effected by the prevention of disease. Men with larger means at their disposal, and with more knowledge of these matters than I can command, have failed in the attempt satisfactorily to reduce these items to numbers. Mr. Chadwick* observes, that of the pecuniary burdens created by the neglect of sanitary measures at large, including the cost of maintenance during the preventible sickness, any estimate approximating to exactness could only be obtained by very great labour, which does not appear to be necessary;

* Report on an Inquiry into the Sanitary Condition of the Labouring Population of Great Britain, 1842, p. 188.

and further,* that the public loss from the premature deaths of the heads of families is greater than can be represented by any enumeration of the pecuniary burdens consequent upon their sickness and death. If, therefore, almost insurmountable difficulties present themselves to calculating the sum total of pecuniary loss entailed upon the community by preventible disease, it follows that we have still less a satisfactory basis upon which to found a mathematical demonstration of the loss resulting from the one item of improper neglect at the first outset of disease, and during its continuance, among the labouring classes. It is only right to allude to this difficulty, to show that it has not been lost sight of.

I venture to assume as admitted, that we may, apart from what are commonly called sanitary measures, by providing nurses for the poor when incapacitated from following their ordinary avocations by illness, prevent a large amount of disease, and consequently effect a considerable pecuniary saving to the community. The next question which appears to suggest itself, relates to the character of the nurses to be supplied. It is important that no exaggerated estimate be formed, that we may not frustrate our intentions by making demands of a nature not to be met; we must not, therefore, think it necessary, nor would it be desirable, to supply to the labouring classes nurses of the same qualities, and with the same pretensions, as those we procure from the training institutions for the wealthy. No private charity could achieve an undertaking of the kind, if it were attempted; and it is very questionable whether, if it could be done, it would be most advantageous to the parties whom we desire to benefit. The nurse to be sent out to the sick poor must essentially be an assistant; she must be able and willing to superintend the little household, or to mind the children, or do anything that the limited circumstances of the parties may render necessary; she must be habituated to their ordinary scanty mode of living, and not be spoilt by intercourse with the servants and members of the higher classes for the performance of those menial duties which will devolve upon her, if she is properly to fill her post. She must be one of the class she visits; she must be able to appreciate their wants, and to regard herself, *pro tempore*, not as a luxury, but as an integral part and a necessity of the family into which she enters. That a well trained nurse, actuated by Christian benevolence

* Report on an Inquiry into the Sanitary Condition of the Labouring Population of Great Britain, 1842, p. 269.

and charity, may do all this, and more, is beyond all doubt; but we must employ such materials as are most likely to be forthcoming; and, though they may not be of the best quality, we shall be more likely, in the present condition of our social machinery, to obtain permanent results by availing ourselves of what exists, than by attempting an entirely new creation. It appears to follow that we must develope some scheme, of a practical character, adapted to existing institutions, by which it shall be possible, at a minimum primary outlay, to provide for the sick poor of the entire country nursing attendants, who may be easily accessible, whose knowledge of the duties to be performed, and position in life, will render them willing and acceptable agents; and further, that, if such a scheme can be proposed and carried out, we shall soon effect a large saving in money to the poorer as well as to the wealthier classes, while we shall remove an amount of misery and destitution affecting the former, which is amenable to no other treatment.

There are two main points of view in which this matter can be regarded—the politico-economical view, which has been urged; and the ecclesiastical view, upon which, more or less, the schemes of a similar nature are based, which we meet with in other countries.

If it were possible to found any proposition of the kind in Great Britain upon religious convictions only, or to establish a distinct framework analogous to that of the Sisters of Charity of Roman Catholic countries, it might perhaps eventually work better and more effectively: but we must discard such an attempt as utterly futile; the absence of anything like religious uniformity at once negatives the feasibility of such a plan; and it is only because the view we advocate appears in itself consonant with our national habits of thought and mode of action, that we also believe that it may be realised. At the same time, it is hoped that our scheme in no way excludes, but rather aids in, the development of those principles of Christian benevolence and charity, without which all our endeavours must fail to produce the fruit we wish to ripen; for, while avoiding anything likely to introduce differences of a sectarian character, there will be full scope for the drawing together more closely the different classes of society, and for consolidating and extending those principles of Christian brotherhood upon which modern civilisation is based. Several corollaries suggest themselves in connexion with this matter, which I pass over for the present; and I proceed to explain the practical solution of the problem which I have to offer.

Given, the existence of a large amount of sickness, loss of time, and consequent destitution among the labouring classes, throughout the country, unavoidable or irremovable under the present state of our institutions;—

Given, a large increase of our national expenditure, of our poor and county rates, resulting from the prevalence and spread of disease among the labouring classes, in the shape of direct pecuniary relief, of burial fees, of the support of orphans, contributions to lunatic asylums, and the like;—

Given, the necessity of providing for the removal of a certain, indefinable, proportion of these evils, by arresting incipient disease, or preventing its spread; and lastly—

Given, the further necessity of doing so, by supplying throughout the country a staff of nurses competent to attend to the sick, under the direction of the medical men, as well as to aid the respective families in their domestic avocations:—

It is sought to show that this may be done, by an adaptation of existing machinery, at a comparatively trifling primary cost, and with the certainty of large benefits of a pecuniary, sanitary, and moral nature.

The projected remedy is this: To employ the able-bodied men and women, that are now maintained in the workhouses, under certain necessary rules and restrictions, for the purpose of nursing; and to make the workhouses both the nuclei of the system, and the places to which the parties requiring nurses may apply.

By the returns of the Poor-Law Commissioners, we learn that there are a certain number of able-bodied men and women in every workhouse in England and Wales. From the Fourth Annual Report of the Poor-Law Board, for 1851, I find that on an average, as shown in the subjoined table,

No. of Unions in England.	Total of Persons relieved by Unions.	Out-door Paupers.			Able-bodied in Unions.	
		Total.	Not able-bd.	Lunatics.	Males.	Females.
553	761,216	658,594	329,810	8,319	8,269	12,868

Average number of able-bodied men in each union, about 15
Average number of able-bodied females in each union, about . 23

there are fifteen men and twenty-three women of this class in every union in England. They are now useless members of the community; they, like the other inmates of our workhouses, are even less the objects of Christian philanthropy than the denizens of our prisons. Labouring under the stigma of pauperism, they seem cast out of the pale of so-

ciety. By giving them a suitable and useful occupation, we raise their moral dignity, while we confer a benefit upon the community at large. The practical difficulties—independent of any obstacles that may present themselves on the part of the poor-law guardians—are, that these people perhaps require more training than the workhouse infirmaries may afford, and that some prejudices must be overcome on the part of the classes to whom they are to be sent. But surely these are not insurmountable impediments; the former may be remedied by the appointment of a superintending nurse or matron, by training in the infirmaries, under the supervision of the guardians of the poor, the clergy and medical men of the union; the latter must be overcome by the spread and force of public opinion, which in this instance would mainly depend upon the countenance afforded by the medical practitioners of the neighbourhood. Our knowledge of human nature, and the special experience offered by provident institutions of all kinds, teach us that we should not offer our boon gratuitously, except where it is unavoidable; the saving to the individual families, it is apprehended, would be sufficient to enable them to remunerate the nurse, or to pay a sum to the union for her services. A minimum and maximum rate might be fixed in different localities; and by this means we might be enabled to offer to the deserving nurses a bonus to stimulate them to good behaviour. Thus an incentive would be held out, which would prevent the nurse from regarding her work as forced drudgery; and she would discharge it with a very different *animus*, than if no benefit could accrue to her from it, beyond the scant praise of her workhouse superiors. Until the system had been brought into working order, the aid of the clergy and of visiting societies would be specially invoked, to establish a more minute and careful supervision of the workhouse nurses than the paid officials alone could carry out.

It is here that I would briefly allude to the corollaries which seem deducible from the system proposed, and to which I have above adverted. It is hoped that, by introducing a feeling of competition, and a prospect of independence, among the pauper inmates of unions, their *morale* will be raised; and that the hopeless condition, which establishes a close analogy between these monuments of modern political economy and Dante's *Inferno*, may be ameliorated. Thus a benefit will be conferred upon the individual through whom it is desired to benefit others, as well as upon the community. It is probable that the emulation will extend beyond the

workhouse doors, and that, by supplying partially the want of nurses, many respectable females may be induced to devote themselves to one of the most honourable pursuits for which females are fitted; and that, in the course of time, a discreditable nurse may be what she now unfortunately is not, a *rara avis in terris*. Should in this way eventually the employment of workhouse nurses be rendered unnecessary, it could only be a matter of rejoicing; the object would be gained more fully than can now be anticipated. It is not unreasonable to assume that indirect beneficial results may arise from the system, if well supported and efficiently carried out. "Our workhouses," as I remarked in a pamphlet published on the same subject in 1849, "our workhouses have not hitherto met with that attention on the part of the higher ranks, and more especially of the visiting ladies, which they deserve. An intimate acquaintance with the necessities, moral and physical, of the inmates, will lead to a better knowledge of the relations and wants of the poor generally, and encourage kindly feeling on all sides. Everything done to raise the *morale* of the poor, will react beneficially upon the wealthy classes; and will tend to diminish the amount of crime on the one hand, and the poor and county-rates on the other."

It was originally proposed to apply the scheme only to the able-bodied females residing in workhouses. A gentleman, formerly in large practice in a country district, who in the main coincided with the views which have been submitted to your notice, has informed me that it would be a great advantage to country practitioners if, in certain cases, they could obtain male assistance; he alluded to delirium and insanity, and stated that two or more able-bodied male nurses in an union, for out-door purposes, would find ample employment in this way. There can be no doubt that many similar suggestions might be offered, and would prove very salutary, if the subject were fairly grappled with. I now merely wish to contend for the principle; the mode of realising it must necessarily vary in different localities. The labour requisite to carry out so extensive a plan is greater than an humble individual like myself, with the cares of a work-day life, can cope with. I can do little more than solicit the kind attention of my professional brethren to the subject. For five years it has been uppermost in my heart; and the earnest conviction that society is called upon to provide a remedy of the kind suggested—a conviction only strengthened by time and reflection and inquiry—has given me courage to submit

the subject to this learned assembly. As a subject closely allied to one of the professed purposes of the Epidemiological Society, the prevention of disease, it appears to have a special claim upon the consideration of the members. I only entreat that they will not cast the proposition aside on account of the desultory manner and feeble voice of the advocate, but that they will decide upon the question at issue by the light of their own experience. If their verdict be in favour of the scheme, there is much hope that it will prosper—that the seed will germinate and spring into vigorous life. Most earnestly do I hope that such may be its fate.

ON THE PROPHYLAXIS OF CHOLERA BY SOME OF THE VEGETABLE AND MINERAL ACIDS.

By J. H. TUCKER, Esq., Hon. Secretary to the Epidemiological Society.

In a paper I had the honour to read before the Epidemiological Society in July 1854, "On the use of Vegetable and Mineral Acids in the Treatment, Prophylactic and Remedial, of Cholera and other Epidemic Disorders of the Bowels," the mineral acids were dwelt upon in relation to diarrhœa, choleraic diarrhœa, cholera, and dysentery, as were also some of the vegetable acids.

I propose on this occasion to speak of the vegetable acids, as preventive of diarrhœa, choleraic diarrhœa, and cholera; and chiefly on the products of the apple—cider, and cider vinegar, when the first and second stages of fermentation have been completed.

Mr. Hunt first drew my attention in 1849 to the alleged exemption of some of the cider districts in Herefordshire from cholera, and this induced me to make inquiries of some medical men in and near my native village in Somersetshire, in order to ascertain from them whether the like exemption existed there, cider being the common beverage of the inhabitants. Replies were received from two gentlemen, which were published in the *Lancet* for July 30th, 1850; but it was not until I had read Mr. Herapath's observations, published in the *Lancet* for August 1851, on the exemption of cider districts from cholera, that I began to think seriously of cider as a prophylactic of cholera.

Since the reading of my first paper, I have endeavoured to obtain further information on the subject, and trust the result of my exertions will afford some degree of satisfaction.

I may first be permitted to allude to certain facts and ob-

servations bearing on the subject which have already been published by accredited authors. Dr. Aiken, in his work on cholera, published in August 1854, mentions the acids in relation to that disease. After having dwelt on the prophylactic powers of quinine and wine in fever, and having alluded to Dr. Bryson's work on the subject, he thus continues:—"It is quite possible that certain remedies of this class may induce such changes in the blood, as shall be either incompatible with, or at least strongly resist the primary changes induced by the morbific influence of the cholerac poison over the fluid. It has been supposed by some that certain acids exercise this power; and, although the data adduced are perhaps too scanty to warrant any definite conclusion, yet, from the hints already furnished, there is reason to expect a satisfactory result."

Dr. Headland, at page 129 of the second edition of his work "On the Action of Medicines on the System," states:—"It appears likely that the catalytic action of the vegetable acids consists in a certain illunderstood control over the progress of various cachexies and blood degenerations."

Among others it has been asserted, apparently upon reasonable amount of evidence, that these acids afford a sort of exemption from liability to Asiatic cholera. Again, at page 222, Dr. Headland says—"It is possible that Asiatic cholera may be connected with a rapid and fatal degeneration of the blood, produced by some septic influence; and there seems to be much reason for supposing that those who are accustomed to the use of the vegetable acids as articles of diet, as in the cider districts of England, are rendered thereby less liable to the attack of this disease."

Mr. Hingeston, of Brighton, has alluded to one of the vegetable acids as prophylactic of cholera. In the *Association Journal* for June 29th, 1853, will be found a letter from that gentleman on the probable recurrence of cholera this summer. Mr. Hingeston states,—"Indigestion, with heat at the præcordium, is again complained of; it appears to me that there is a want of acid in the blood, and that this form of dyspepsia is relievable by the vegetable acids, such as lemon juice."

In the pursuit of my object, I have had occasion to search for the opinion of authors who have written on the plague, a disease which Dr. Southwood Smith (in his Board of Health Reports) maintains to be, with yellow fever, allied to cholera. I find it stated, that the adoption of certain measures saved the lives of some who were, years gone by, subject to the

influence of plague; why therefore need we despair that similar ones may be found to protect others from the cholera? Lemon-juice, vinegar, spirit or oil of vitriol, were among those which were adopted by good authorities, both as preventive and remedial of the plague.

It has been remarked that when diarrhœa ensued in patients attacked by plague, death was almost certain; whereas constipation was a favourable sign.

The value of sulphuric acid in preventing diarrhca and choleraic diarrhœa from passing into confirmed cholera, has been already tested. The *Lancet*, for October 3rd 1855 remarks thus ("On the Supplemental Report of the Medical Council of the General Board of Health." "On the Results of the Different Methods of Treatment of Epidemic Cholera throughout England and Ireland in 1854): — The most interesting and important portion of the series to the medical practitioner is the last, which gives the results of the different methods of treatment pursued in epidemic cholera."

In 1542 cases, the order of failure of remedies to prevent the promonitory diarrhœa from passing into confirmed cholera, would appear to have been catechu, kino, etc., with the employment of which the failures were fifty per cent., followed in order by salines, eliminants (castor-oil), calomel, calomel and opium, stimulants and astringents; and in this respect the treatment with sulphuric acid appears to have answered its purpose most fully, the percentage of failure with sulphuric acid and opium being set down at 5 per cent.

The value of vinegar and lemon-juice as preventives of cholera has yet to be shown. The fruit of the lemon-tree is too well known to need any eulogy from me. Its renown as an antiscorbutic none can (I believe) dispute, but whether it will prove hereafter to be protective from cholera experience must teach. The value of the juice of the lemon and of other fruits, save the apple, as regards diarrhœa and cholera, I shall leave to others to investigate.

I will now proceed to read some letters and other documents from medical gentlemen now living chiefly in Devonshire, Somersetshire, and Herefordshire, the three principal cider counties in England, in reference to the subject on which I am specially treating. Two of the letters were read by me on a former occasion, and I find I cannot well avoid reading them again on the present one. The first to be read was written by Mr. Sharpe, of Wedmore, Somersetshire, who had resided in that village but for a short period when he forwarded the communication to me in 1849. Mr. Sharpe

succeeded Mr. Hancock in practice, whose communications will also be read with respect to cholera in 1832. Mr. Hancock at that period was parish surgeon. Mr. Hancock left England for America on family matters, he has lately returned to Wedmore.

Mr. Sharpe's letter, dated Dec. 1849, is as follows:—

"I beg to state, in answer to your inquiries respecting the late visitation of cholera, that I believe, in the parish of Wedmore, comprising a population of about 4,000, there have not been more than three cases of true Asiatic cholera, and very few cases of diarrhœa. Why such was the case I cannot give an opinion; for, in some of the districts, the inhabitants are both badly fed and clothed. The principal beverage is acid cider, of which they drink an immoderate quantity. The habitations of the poor are of the most wretched description. I am led to believe, from what little I can glean, there were only a few cases of the disease in 1832."

Mr. Millard, of Churchill, Somersetshire, wrote thus in January 1850:—

"I have been surgeon for eight years to district No. 5 in the Axbridge union, consisting of the parishes of Churchill and Windscombe; and during that period there has not been a single case of cholera. Cider is chiefly drank; which, in my opinion, is a more wholesome beverage than malt liquor. The air in this locality is particularly healthy, and the dwellings of the poor not overcrowded. The population is about 3,000."

My observations on these communications, read in my former paper, and published in the *Lancet*, July 1850, and in 1854, are as follows. Wedmore lies in a valley, on a level with the Cheddar Moors, where, in days gone by, ague and typhus were frequent; there, according to Mr. Sharpe's account, three cases of true Asiatic cholera came under observation, and a few cases of diarrhœa. The position of the poor, their habitations, and the locality, were such as to encourage the spread of the disease; yet only three cases were known, in a population of 4,000. Can the merit here be awarded to the cider?

Churchill is located on high ground, the air is salubrious, and the habitations of the poor not overcrowded; it is distant eight miles from Wedmore, and about fourteen from Bristol and Bedminster, where cholera raged to a fearful extent. To what cause is Churchill indebted for its exemption? Has cider, as a prophylactic, any claim?

The following is extracted from a note addressed to Dr. Hastings (now Sir Charles Hastings) by Dr. Lingen, of Hereford, dated November 9th, 1849.

"The overabundance of vegetation in this county, the free use of cider, and the almost contemptuous disregard of ventilation and sewerage evinced in these remote districts, are circumstances, one would say, *à priori*, highly calculated to imbibe and retain the scourge. We desire to thank God for our freedom from it; nevertheless, we would gladly discover any conducing means by which our immunity has been effected. You know better than I do the nature and quality of our surface as a country. We are on the old red sandstone, and have lime here and there; we have a clayey soil, interspersed with gravel. It may be that, so far from cider being productive of such a disease, it tends to keep the system in good order. I am highly impressed that it is really a wholesome drink, and less adulterated than beer."

As I find this to be the only communication from Herefordshire, among others placed in my hands by Mr. Hunt, I will direct attention to page 51 of the Registrar-General's Report on Cholera in 1848 and 1849, as follows: "In the county of Hereford, only *one* death from cholera was registered in 1849. A labourer's son, aged 9, died of cholera at Bargates, Leominster, on September 30th." I have since ascertained that the son of the labourer contracted the disease in another county, and was removed in a dying state.

"This county lies high; the population is scattered over the country, and engaged in agriculture; it is out of the line of railways. The common drink of the people is cider."

The following is copied from a note addressed to Mr. Hunt, by R. L. Pennell, M.D., Exeter, dated Jan. 29th, 1850.

"In reply to your first question, whether cider is the usual drink of the labouring population in Exeter, I have to say that beer is the common drink of the soldiers of the 82nd Regiment, whilst in the barracks at Plymouth, and also since their arrival in the barracks near this city. I have reason to believe that the large proportion of persons attacked with cholera in this city were beer-drinkers."

Mr. Hunt also placed in my hands some voluminous answers to questions with respect to cholera, asked in a printed form, by the Provincial Medical and Surgical Association. Among them, I find, "Observations on the late visitation of cholera in the city of Exeter", by Dr. Pennell, which terminate thus: "I cannot recommend any method of treatment in this disease from my own experience; but, as the subject

of cider has been brought forward, I will briefly state a communication made by Mr. Tucker, a practitioner of great experience in his profession, and of long standing in this city (Exeter). Mr. Tucker says, that in 1832, being concerned in the treatment of the poor, a very large number of cholera patients came under his notice. The usual and varied remedies were employed with so little success, that he became dissatisfied with them all; so that he resolved to attend to the wishes of his patients, and let them have whatever they asked for. He mentions a young woman, aged 18, to whom he was summoned in August 1832, at seven in the evening. She had been taken ill about an hour, with all the characteristic symptoms of Asiatic cholera, such as vomiting, and purging of rice-coloured fluid. When he saw her, the powers of life seemed all but gone, extremities cold, no pulse, weak action about the heart, and the skin perfectly blue. Brandy and ammonia were first given, which she rejected; and warmth was applied to various parts of the body. At this time she asked eagerly for cider, in a low whisper, scarcely audible. Half a pint was given with some ginger; she drank it with avidity, and asked for more: another half pint was given. Mr. Tucker then left her, with directions that the warmth to the body should be continued, and that she might take as much cider as she called for. The next morning she was much better; the skin was warm, with a tendency to become moist, and the blueness was much less. From this time she gradually recovered, and is now living. The quantity of cider she took during the first night was seven pints.

"Within a few days, in the same neighbourhood, another case of cholera occurred. The same treatment was adopted; five quarts of cider with grated nutmeg were taken in twenty-four hours; all the symptoms yielded; and the patient (a male) recovered, and went about in the open air. A fortnight after, he had another attack of cholera, of which he died. On this occasion, Mr. Tucker did not attend him; but he ascertained, upon inquiry, that no cider was given to him.

"Such is the account of two cases successfully treated by this liquor. Of course no conclusion can be drawn from them, further than that the remedy is well deserving further trial, particularly as the prophylactic and therapeutic qualities of this beverage are become the subject of medical inquiry.

"It has been thought by some, that the quantity of rough cider consumed by the peasantry of this county is the cause

of rheumatism prevailing so much among them, in fact, a large proportion of the medical cases received into our hospitals consist of this class of persons afflicted with the chronic form of the disease. I do not, however, think that this opinion is shown to be well founded. The constant exposure to wet and cold is quite sufficient to account for its prevalence among them."

When I commenced this paper, I was not aware that the value of cider was known as a remedy for cholera as far back as 1832. Mr. Sharpe, in his communication to me in 1849 remarked: "I am led to believe, from what little I can glean, there were only a few cases of the disease in this locality in 1832." Mr. John Hancock, of whom I have previously spoken in connexion with Mr. Sharpe, favoured me in May 1855 with the following relation:—"Practising in this neighbourhood in 1832, when Asiatic cholera first made its appearance in England, I was called to the majority of cholera cases at Wedmore, and I do not remember a single instance of this fatal epidemic having occurred in the better classes of society, otherwise those who were in the habit, and had the means of procuring the beverage common to this part of the country—cider. I attended fifty-three cases of severe diarrhœa and cholera, all among the poorer classes, and those females who had not the means, directly or indirectly, of procuring cider. How far cider acts as a prophylactic against the pest I am at this moment unprepared to speak; but should it again unfortunately be my lot to attempt to investigate the ravages of this fatal epidemic, I will not lose sight of your views, and will record any and everything bearing upon the point."

Mr. John Jackson Goodridge, surgeon, of Paignton, Devonshire, favoured me with the following in April 1845:—"I perfectly recollect writing the letter you mention, and am glad to have an opportunity of communicating to you my opinion and experience with regard to cider as a common beverage. Having practised in this part for the last forty years, I have had a great opportunity of observing the effect it has had on the labouring classes in this neighbourhood. Our parish has always been considered one of the healthiest in this county, being mild and free from dampness, and our soil being sandy we have not that great evaporation which is attributed to most parts of Devonshire. I think we number about two thousand seven hundred inhabitants, and I should calculate that from seven to eight hundred are labourers, whose daily drink is cider, each man taking his two quarts a day, and a

more healthy set of men, it is impossible to see. They are most of them in friendly societies, and come under my immediate care. We have some few mechanics, who for the most part drink malt liquor, and I always find them much more intractable patients than those who drink cider.

"With regard to the prophylactic properties of cider there can be no doubt, as the neighbourhood was twice visited by cholera, and we were surrounded by the disease, and each time escaped, not having had a symptom of it. I think it would be not quite fair to place it all to cider; I, in some measure, attribute the exemption to our soil being very absorbent, dry, and sandy.

"The diseases most prevalent here are sciatica and rheumatism, which I think are caused in this way. Most of the labourers leave home of a morning with their dinners and a keg of cider, and take their meals by the side of a hedge, let the weather be what it may, and remain there an hour. I have often had occasion to observe that I have been called in late of an evening after a rainy day to attend upon those attacked.

"It has been remarked that a great number of our old labourers are lame, no doubt from the above cause. Generally speaking, they live to a good old age; and I have known men live to the age of ninety, the latter part of whose lives was daily spent in intoxication from cider. Not so with malt liquor. I generally find men who have lived freely on that beverage become bloated and die prematurely."

The next communication is from William Gillard, Esq., surgeon, of Totnes, Devonshire, March 20th, 1855.

"I have never known cider," says this gentleman, "the cause of any disease such as colica pictonum, or rheumatism, and certainly I may say I never knew it to produce cholera; and I believe I can confidently assert that the cider districts have been generally most free from that disease. I can also assure you that in many cases of dyspepsia I order an abstinence from malt liquor, at the same time recommending cider."

In my former paper, I quoted Dr. Mitchell of Dulverton, who had communicated to the *Lancet* on the subject of cider; and, being anxious to obtain further information, I wrote to that gentleman, and received from him a long article, a portion of which I will read, on the use of the vegetable and mineral acids, as employed by him.

"In answer to yours of the 24th instant, which did not

reach me until this day, I have to inform you that I have used acids in diarrhœa, dysentery, etc., for these last forty years." Dr. Mitchell then alludes to his having used sulphuric acid in 1832, at the Redcross Street temporary cholera hospital in London, and states his reasons why and with what results, and thus continues. "You ask my opinion of cider in diarrhœa and dysentery. My treatment has always succeeded in dysentery, even when the patient has been abandoned under other prescriptions, and in such a state of prostration as to be unable to be taken out of bed; and with a frequent discharge of mucus, bloody, painful evacuations, and constant tenesmus, I have ordered and seen carried out as a dietary, cider *ad libitum* with only two small biscuits in twenty-four hours. This has been continued for weeks, until the disease has been completely removed. I have seen patients under this treatment regain strength, although kept on so limited a diet.

"About two years since, dysentery raged with great violence for a long time in the Cornwall Lunatic Asylum, destroying the lives of a number of its inmates. I was called in during its continuance. I ordered, as I always have most successfully in such cases, cider, excluding all other liquids, with only a very small quantity of toasted bread or biscuit, a line of treatment which had the desired effect in all cases, preventing any more deaths from diarrhœa or dysentery during my attendance, which has been frequently remarked upon since by Mr. Kendall, the member for East Cornwall, who is chairman of the visiting magistrates.

"The talented surgeon of this Asylum was appointed to Colney Hatch establishment; and in his report remarked how this generally very troublesome disease, in this, as well as in other houses of the sort, was kept under control by the treatment I have named—in fact, prevented—by substituting cider for ale as a drink. I have been told by patients that cider produces cramp. It always has a contrary effect, causing this painful state almost directly to cease.

"I called the attention of the Board of Health to this treatment more than once, which not being noticed except in an official way, caused me to direct the attention of the profession at large to its efficacy. Cholera has appeared at Bodmin in several instances, but in no case has it spread, only one death from it having taken place in the town; that of a woman taken out of a van in a dying state. I could name almost every town in cider districts in the west of England where cholera never could get a footing, except in

places where ale is the chief beverage. I have no hesitation in saying that if there is a specific in diarrhœa (which I doubt), cider is that specific."

Mr. Gillard of Totnes, in August 1853, favoured me with a second communication, which I will read.

"I have made inquiries of many medical men in our neighbourhood, and none of them have ever known cider produce an attack of cholera; indeed, we all consider the cider districts most free from its visitation. In 1832, we had many cases in Totnes; about fifty reported, and sixteen deaths, mostly females; I should from recollection say, that not one of those attacked drank cider.

"Cholera has not appeared since that date in my district. Brixham has had two visitations since; Dartmouth, two; South Brent, one; as well as a small village near Ashburton. In neither place should I say there was ever much cider drank. Good fermented cider is undoubtedly wholesome; but in that you get from the manufacturer, or cider merchant, the process of fermentation is checked. Query, does that benefit it? As for cider from the press, or what you call *sweet cider*, when a boy, I perfectly recollect a very favourite amusement was sucking it through a reed, and then we called it 'nimble go through.'"

In addition to these, I have received communications from Mr. Kellock of Totnes; Mr. Woollen of Wedmore, Somerset; Dr. Turner of Kensington; and Mr. Davis of Pershore, and others; but as these gentlemen have written on the general rather than on the special properties of this beverage, I reserve their valued assistance for a future occasion.

In July last, I forwarded to the *Lancet*, and *Medical Times*, the following question, which appeared in these journals for July 14th, 1855.

"IS CIDER A PROPHYLACTIC OF CHOLERA?

"Sir,—Having reason to believe that good fermented cider is a prophylactic of cholera, I should feel obliged if any one of your readers who may have attended a case of cholera, in a cider drinking patient, will kindly inform me of the circumstance, either through the medium of your journal or by private communication. No such case has come to my knowledge."

I am not aware whether any communication on the subject has appeared in either of the journals since the question was asked. The following is the only one sent to me.

From E. Snell, Esq., surgeon:—

"18, Crown Row, Mile End Road, July 16, 1855.

"My eyes have just fallen on a paragraph in last week's *Medical Times and Gazette*, requesting information regarding cholera affecting cider drinkers. In this respect, I am sure you will find a difficulty.

"I received my early professional education in Devonshire, and was afterwards in practice in the same county for some years, and more particularly in a locality where the purest cider is drank to a very great extent both by masters and labourers. I never saw or heard of a case of cholera affecting either, very seldom even a case of diarrhœa, excepting in those persons having taken cider before it was in a fit state to drink."

In the *Medical Times and Gazette* for Oct. 27th, 1855, will be found the following letter from me.

"IS CIDER A PROPHYLACTIC OF CHOLERA?

"Sir,—I beg to offer you my sincere thanks for your having given insertion in your journal of July 14th to my query on the above subject. I have nowhere noticed that the question has been negatived; and with your permission I will now entreat your readers to favour me, either through the medium of your journal or by private letter, with any facts they may possess with respect to the value of good cider, in a medicinal, dietetic, or prophylactic (of cholera) point of view, or with facts adverse to its use; my object being to lay before the profession as early as possible all the information I can glean on the subject.

"At the present moment, I have every reason to hope that I shall have it in my power to remove the prejudices which have so long existed against this wholesome health-producing, and oftentimes delicious, beverage."

Since the publication of the foregoing, I have received no information for or against the use of cider.

A communication has, however, reached me from Mr. Hancock of Wedmore, on cider, which I will read after I have made a few observations on Dr. Varrentrapp's communication on cholera, read before the Society in August last.

In that communication, Dr. Varrentrapp alluded to cider as having been drank by persons who afterwards died of cholera. The liquor Dr. Varrentrapp spoke of was styled by him "sweet cider" (before fermentation), and he concludes his observations thus:—

"In several cases that happened during the next months, errors in diet seem to have been the cause. In several in-

stances, the disease was ascribed to the use of sweet cider, in larger or smaller quantities. At all events, we should not suppose in our town, where a very large quantity of cider is drank (100,000 to 150,000 hundred weight of apples being used for cider in a year), that cider could be of any use in cholera, or even in choleraic times. Assuredly, of all drinks, cider would be the first to be forbidden with us, as melons were in France in the times of epidemics of cholera."

I presume that the liquid which Dr. Varrentrapp styled "*sweet cider*" (before fermentation) was in reality not cider. Cider is the fermented juice of apples, not the juice of apples before fermentation, nor during the process of fermentation —in fact, it is doubtless the fermented, not the fermenting, juice. The apple juice recently expressed, and for some time after, to my knowledge, acts as a drastic.

Sweetwort is not ale, and sweetwort acts as an aperient. The juice of the grape is not wine until fermentation has ceased, and Dr. Varrentrapp stated that sweet wine, before fermentation, occasioned cholera. Treacle, sugar, and water, when mixed together, are not vinegar, until they become sour by fermentation.

Dr. Varrentrapp compares the cider of his country to the juice of the melon; the cider of this country has been sometimes likened to vinegar and water. I know not what condition the sweet cider in Dr. Varrentrapp's locality may be; but in some parts of England cider which has been well and properly fermented retains a fair amount of sweetness, and is both palatable and wholesome. I have read and heard that in some parts of Germany cider of a very inferior quality is vended.

Dr. Varrentrapp resides at Frankfort-on-the-Maine.

Dr. Virchow, who resides at Bonn, has likewise forwarded a communication on cholera to the Epidemiological Society, in which cider is named. Dr. Weber, to whom in the first instance the communication was sent, states that Dr. Virchow resided during the epidemic of 1848-49 at Berlin; during that of 1853-54 at Würzburg. Dr. Virchow writes "that Würzburg has never been seriously visited by the cholera, although other districts of Bavaria had not remained exempt. During the last epidemic several cases of cholera were imported from Munich, but the disease did not spread. The immunity from the disease was not confined to the neighbourhood of Würzburg, but comprised the greater part of the Maine district, and extended along the banks of that river to Frankfort, with the exception of a few sporadic cases (imported)."

To question No. 10, series v, issued by our Society, Professor Virchow replies thus:—

"That vinegar and acid wines are much used in the district of Würzburg and Aschschaffenburg, and that cider is a common beverage on the lower course of the Maine."

As Professor Virchow has named cider in conjunction with vinegar and acid wines, I presume such cider must be the acid or hard cider. Besides, I have conversed with those who have drank the acid cider on the continent. A great quantity of such cider, I am informed, is used by some wine merchants who imitate foreign wines. The same takes place in some parts of England. Hence many persons who would not be tempted to drink cider, have enjoyed it somewhat disguised and under another name.

In proof of this, I beg to refer to *A Treatise on the Falsifications of Food, etc.*, by John Mitchell. At page 118 of his work, Mr. Mitchell remarks thus:—"I may mention that, among the substances convertible into wine by the addition of colouring and flavouring matter, is cider, many thousand pipes of which, in a state not drinkable as cider, are manufactured into fictitious port wine."

During a visit in Somersetshire, in August last, a gentleman, Mr. W., not of the medical profession, said, in relation to cholera, that he thought he could name some cases which would serve to prove that cider, as a preventive of cholera, was not always to be relied on. He then mentioned four persons who had died of cholera at Godney, and who were, he understood, during lifetime cider drinkers. Messrs. Sharpe and Hancock, therefore, inquired into the matter; and on the 28th October, 1855, the following communication reached me from Mr. Hancock.

"I have at length made inquiries relative to the cases of cholera reported as having occurred at Godney, by Mr. W.; and, strange to say, the facts bear you out in your doctrine to the very letter.

"There were five persons attacked within a circuit of three hundred yards. A father and son, who had been teetotallers for the last twenty years of their existence, and men who strictly carried out the doctrine of total abstinence. Both fell victims to the plague in a few hours.

"Another man of the same faith, also fatal. The fourth case was that of a confirmed drunkard, 'a cider swiller,' and while in intense agonies from spasm, he constantly called out for cider. At last it was given to him. This man recovered, and is now living.

"In the particular case of Mrs. W., brought forward also by Mr. W., who almost died in his presence, the facts prove to be, that she also was a water drinker, and had never been known in the remembrance of her husband to drink cider."

Having thus placed before you, Mr. President and Gentlemen, that which I have considered to be the most important communications from medical authority, on the subject of cider, I will make a few observations on the juices of apples in the second stage of fermentation—cider vinegar. In my former paper, I suggested vinegar as a substitute for cider, as a prophylactic of cholera, supposing then that London and other populous places could not be supplied with a sufficient quantity of pure cider for consumption.

Various authorities were quoted by me as to the medicinal and dietetic properties of vinegar, and I dwelt somewhat on adulterations of that article. About that period, my attention was accidentally drawn to cider vinegar; and remembering that such was used by my forefathers, and by myself in early life, I resolved to give it a trial in my own family. For the last eighteen months cider vinegar only has been used at my table. Many of my patients and friends have highly approved of it, some preferring it to malt, or even wine vinegar. Cider vinegar is chiefly used as a condiment, and for pickling in cider districts, and it is frequently given to the poor for such purposes. A portion of the cider vinegar in my possession has been partly analysed by an analytical chemist at one of the metropolitan hospitals, who has thus reported on it.

"I have examined the vinegar you left at the hospital. Its acidity is due almost entirely to acetic acid. There is a minute proportion of sulphuric acid, and also of some crystalline acid, probably malic. The flavour of the distilled vinegar is very agreeable; the acetic æther flavour is modified, probably by the presence of malic æther in addition. I consider it in every respect a very good vinegar."

As far as my own experience goes, from observations made by me when in Somersetshire, and from replies to my questions, I am prepared to state that I believe cider vinegar to be a very wholesome vegetable acid, and one that medical men may with confidence recommend to their patients, both in a medicinal and dietetic point of view.

QUARTERLY REPORT OF THE PROCEEDINGS OF THE EPIDEMIOLOGICAL SOCIETY.

PAPERS READ AT ORDINARY MEETINGS.

Monday, January 7, 1856. "On the Prophylaxis of Cholera by some of the Vegetable and Mineral Acids." By J. H. Tucker, Esq.

Monday, February 4. "Observations on the Cholera Epidemic that occurred in 1854 at St. Laurent d'Aigouze and its environs." By Mons. Raymond Falot. Read by Dr. Camps.

Monday, March 3. "On the Pathology of Cholera." By Philip B. Ayres, M.D.

At this meeting the nomination of office-bearers for the ensuing year took place.

REPORTS.

The Report of the Epizootic Committee on "Pleuro-pneumonia among Cattle," drawn up from the replies to the queries issued some time back, has been received from the secretary of the Committee, and will be read at an early meeting of the Society.

NEW MEMBERS.

Resident. William Odling, M.B., Professor of Practical Chemistry and Natural Philosophy in Guy's Hospital; Robert Nichol, M.D., Hampstead.

CORRESPONDING MEMBERS.

George Lee, M.D., Rio de Janeiro; Robert Lallemant, M.D., Rio de Janeiro; E. H. Barton, M.D., New Orleans.

ERRATUM.

In our last number, when deploring the loss the Society had suffered by the death of one of its Vice-Presidents, Dr. H. F. Hough, the name was inadvertently printed *Gough*.

TRANSACTIONS

OF THE

EPIDEMIOLOGICAL SOCIETY OF LONDON.

Papers and Communications.

ON THE GEOGRAPHICAL DISTRIBUTION OF HEALTH AND DISEASE, IN CONNEXION CHIEFLY WITH NATURAL PHENOMENA.

By ALEX. KEITH JOHNSTON, F.R.S.E., etc., Corresponding Member of the Epidemiological Society of London.

[*Read before the Epidemiological Society, May* 5, 1856.]

The following notes are devoted to a consideration of the extent to which the human family is affected in the enjoyment of health and the preservation of life, by physical or natural causes. The safest guide in such a field of inquiry is statistics, or the accumulated stores of carefully observed and accurately recorded facts, regarding the occurrence of disease in its different forms, its extension or limitation in space, and the periodicity of its recurrence. But reliable tables of sickness and mortality do not exist, except for very limited and widely separated portions of the globe. In the absence of positive data, however, a knowledge of the physical conformation of the earth's surface, and of the meteorological agencies to which it is exposed, affords a means of arriving at certain probable conclusions regarding others of which little or nothing is known.

The object of Medical Geography is to ascertain the laws by which disease is distributed, or the manner in which

certain conditions inimical to the health of the human frame are found to prevail in certain regions or localities. These laws depend for their elucidation on the facts of Physical Geography, embracing geographical position, the nature and elevation of the soil, the amount of moisture, temperature, absolute and seasonal, the direction and force of the winds, and the phenomena of electricity.

In the animal and vegetable kingdoms certain plants and animals are, by natural laws, restricted in their range, within a horizontal and a perpendicular direction, to certain localities; and in like manner we find that certain classes of disease seldom extend beyond their usual limits, as ascertained by observation, and that they exist and perpetuate themselves only under certain conditions.

The surface of the globe presents, with the utmost diversity of climate and soil, the greatest unity in its pathology. The same morbid appearances are reproduced with the utmost constancy and regularity in a thousand places at once, wherever the same causes of insalubrity are met with, only that they are more intense, continuous, and prolonged, in some places than in others.

Similarity of geological formation indicates a similarity in the diseases of a country as seen in the localities visited by malarial fevers. A certain amount of heat, and a sufficient time for its manifestation, are necessary for the development of certain maladies. In the West Indies, the period of disease follows the course of the sun, the unhealthy season occurring at opposite times on the northern and southern sides of the equator. As the sun proceeds northwards in the ecliptic, so the sickly season advances from the southern to the northern islands. In the Mediterranean the mortality is doubled in the hot season, between July and October; and in the southern States of North America the posts of the army are regularly abandoned as the hot or sickly season approaches. But in temperate regions the order is reversed. Throughout Europe generally the maximum mortality occurs at the end of winter, and the minimum in the middle of summer. The Registrar-General of England calculates that a fall of the mean temperature of the air from 45° to 4° or 5° below the freezing point, destroys from 300 to 500 of the population of London. The agency of the wind is manifested in the distribution of heat and moisture, and in the comparative density of the air, as well as by its direct influence as a distributor of malarial poison; and the absence of wind was uniformily noted as a concomitant of cholera, which in

Britain was always most virulent when the calm was greatest, and began to abate when the wind rose. During the great epidemics of Andalusia, 1809-19, the Levanter, a south and south-east wind, was observed to blow constantly for nine months in the year. During the prevalence of the Sirocco, on the Mediterranean shores of Asia and Africa, vaccination fails, as does also inoculation, with small-pox, and ulcers and wounds are more difficult of cure.

As elevation above the surface causes a corresponding reduction in the temperature and in the pressure of the atmosphere, so those diseases which are prevalent at the level of the sea, in cold or temperate countries, are found to be represented by the same, or similar ones, at elevated points in tropical regions, where a corresponding low temperature prevails.

In tropical climates, especially, electricity in its different forms is believed to have a powerful influence on the morbid affections of the human frame; and during the cholera epidemic in Britain, the observations at Greenwich show that the atmosphere was always deficient in positive electricity when the disease was present.

REGIONS OF DISEASE CORRESPONDING WITH SEASONS AND ZONES OF CLIMATE.

The surface of the globe may be divided into belts or zones, distinguished by great leading characteristics; as I, the torrid zone, or belt of greatest annual mean temperature, characterised by the class of diseases which includes *dysentery, yellow fever, diarrhœa, malarial fevers,* and affections of the *liver*; II, the sub-torrid and temperate zone, of which *inflammatory diseases*, represented by *typhoid fevers,* are the characteristic maladies: and III, the sub-temperate, sub-arctic, and arctic zone, characterised by *catarrhs* and *colds.*

I. The immediate dependence of the first class of diseases on heat and moisture, as important exciting causes, is shown by the circumstance that its maximum intensity corresponds with the countries situated under the line of greatest annual mean temperature, the assumed equator of heat of the globe (82° Fahr.); which line also intersects the region of greatest aqueous deposition. From this line, to about latitude 23° north, 53 per cent of the deaths are attributable to this class of diseases; while in latitude 35° north, marked nearly by the line of 77° Fahr. in July, and on the boundary of the second zone, the amount is only 14 per cent; and at the Cape of Good Hope, latitude 35° south, it is only 3 per cent.

As far as can be ascertained, the mortality from the entire classes within this zone amounts to 75 per cent,—the first and second causing 53, and the third 18 per cent. of the whole. The same law of decrease with the lowering of temperature is apparent in the seasons of their occurrence. In a series of dysentery epidemics, narrated by Ozanan, 36 occurred at the end of summer, 12 in autumn, and only 1 winter. Of 13,900 individuals seized with dysentery in Bengal, 7,000 were attacked in the warm and humid season, 4,500 during the hot and dry season, and 2,400 during the cold season. In spring these diseases are more inflammatory in their character, and in autumn more putrid.

The northern limit of this class of diseases is probably the Bermudas, latitude 32° north, in the Atlantic; and California, latitude 38° on the Pacific Ocean, in America. In Asia it extends to near Pekin, latitude 40° north; and in Europe to the south of Spain. Its southern limits are—in America, Buenos Ayres, latitude 34° south, on the Atlantic, where, however, it is not severe; and Lima, latitude 12° south, on the Pacific. In Asia the southern limit includes Aracan, Ava, and Ceylon, Borneo, and the other islands of the Asiatic Archipelago, and thence it extends to the northern shores of Australia. In Africa it includes the island of Madagascar. Within these limits the principal centres of these diseases are, in America, the shores of the Gulf of Mexico, the West India Islands, and the northern portion of South America; in Asia—India, China, Borneo, Ceylon; in Africa—the countries around the Gulf of Guinea on the west, Madagascar and Mozambique on the east, Algeria and the shores and islands of the Mediterranean on the north. Little is known of the perpendicular distribution of these diseases, except that in Mexico they are prevalent at an elevation of 7,000 or 8,000 feet; and in south-eastern Asia they cease at an elevation of 6,000 or 7,000 feet above the sea.

II. In the inflammatory region, or zone, typhus fever, in its varied forms of gastric, bilious, enteric, &c., fever, takes the place of the yellow and malarial fevers of the torrid zone; and in consequence of fewer of the population being cut off with these, more fall victims to inflammatory affections, of which consumption is the type. But that this latter form of disease is not peculiar to this region, or rather that it becomes more fatal as we approach the tropics, is proved by the fact that in England consumption is only fatal to 3.8 out of every thousand living, while Boston (U.S.) loses 4.0, Baltimore 4.1, Philadelphia 4.2, New York 4.9, and New Orleans 5.6 out of every thousand living.

In North America and Europe, the southern boundary of this group of diseases coincides generally with the northern boundary of the first class. In South America, it probably includes Patagonia. In Africa, it includes the Cape Colony; and it embraces the South of Australia, Tasmania, and New Zealand. In Asia it is uncertain how far it extends to the eastward. Its northern limit in America includes part of Nova Scotia and Newfoundland; and in Europe the northern boundary includes the British Islands, Norway and Sweden, to latitude 60° north, whence it appears to follow a south-eastern direction, corresponding nearly with the annual isotherm of 41°, till it gradually declines towards the borders of Asiatic Russia. These, however, are only to be considered as preliminary indications.

III. The boundaries of this group of diseases, which is characterised by catarrhs, include the whole of Europe to the north of the preceding class. In America it extends south to Boston and New York, including the district of the Canadian Lakes. Thence it continues north-west nearly on the line of 41° annual temperature. Although very little is known of the diseases of Central Asia, yet, when we consider the elevation of the surface, the vegetation and the conditions of climate, we may assume that this class of diseases extends there to about latitude 45°. Iceland is the best-known locality of this zone, and may therefore be taken as its representative. The island is visited by catarrh every year in spring or in early summer. It is also visited at short intervals by catarrhal fevers,—a true influenza, which usually has a great effect on the mortality. Pallas says that the majority of Icelanders die, before the age of fifty, from asthmatic or catarrhal affections of the lungs; and Crantz affirms that catarrh is a very prevalent disease in Greenland. Catarrh is also common in Labrador. At Okhotsk in Siberia it is accompanied with difficulty of breathing; and a cough, called "Ho," is endemic among the Samoeids.

SKETCH OF THE CLIMATOLOGY AND DISEASES OF THE DIFFERENT QUARTERS OF THE GLOBE.

Europe.—The continental portion of Europe presents the greatest contrasts in its climate, but it is generally temperate, owing to the extent of sea on its coasts, its numerous inland lakes and rivers, and the Gulf Stream of the Atlantic, the heated atmosphere of which is borne to its shores by the prevailing south-westerly winds. South of latitude 45°, extreme cold is rare and of short duration, and the heat due

to its position is tempered by the elevation of its mountains; but the southern coast-lands are blighted by the hot wind of Africa, the *sirocco;* and, from its exposure to the northerly winds from the Arctic Ocean, the great north-east plain has a severe cold climate.

Nearly every form of disease has its representative in Europe; especially cretinism and goître in the Alps, Caucasus, and Urals, the high lands of Bosnia, and the mountains of Scandinavia; typhus between the parallels of 44° and 60° in Western Europe; yellow fever occasionally on the shores of Spain and Northern Italy; intermittent fever in the Netherlands, a portion of Sweden, Central Italy—in short, wherever marshes exist; consumption in all parts; the plague in the eastern countries; small-pox especially where vaccination has not been introduced; leprosy and elephantiasis in Scandinavia; pellagra in Italy, France, and Spain; and plica Polonica in Poland and Tartary.

ASIA.—The peninsula of Western Asia, from its peculiar formation and the elevation of its table-land, presents striking anomalies in its climatology and corresponding varieties in its temperature. The plague extends occasionally between the parallels before mentioned to the borders of Persia. Remittent fever prevails along both shores of the Red Sea and the Persian Gulf, but is not severe, except in the marshy districts at the mouths of large rivers; and dysenteric affections are seldom met with in either of these regions.

The chief physical features of *Persia* are its vast central table-land, 2500 to 3500 feet above the sea, and the wide salt desert occupying its eastern provinces. South of the table-land, the country is parched and barren, and the heats of summer are almost insupportable. This country, like Beloochistan, suffers from a scarcity of water; but both are comparatively healthy, and not the seat of any remarkable disease. In Bokhara, intermittent fevers are prevalent at the end of August and beginning of September; they disappear with the first frost. In *Tibet,* small-pox is extremely dreaded, and the infected house or village is razed to the ground. Inoculation is practised in *China,* but not in Tibet. The other complaints are dropsy and liver disease; fevers are seldom fatal.

India has every variety of surface, from the level of the sea to the highest mountains on the globe, and its climate partakes of all changes. The year has three seasons—hot from March till June, rainy from June to October, and temperate from October till the end of February. The monsoons regulate

the hot and dry seasons; earthquakes and violent hail-storms are of frequent occurrence, and often cause great destruction to human life. The inter-tropical portion of India comprises the stations of Calcutta, Madras, and Bombay, with an area nearly equal to the northern extra-tropical portion. In Bengal the climate is hot and humid from April to November, the other months are cool and bracing. At Calcutta the mean annual temperature is 90°, and the fall of rain 64 inches. The rainy and stormy season is during the south-west monsoon, from June to September. Madras has a mean annual temperature of 83°, and a mean rain-fall of 51 inches. The north-east monsoon brings thunder and rain, but the country is sheltered from the south-west monsoon by the range of the Ghauts. In the hot season the cool sea-breeze called "the doctor" blows from noon to nightfall, and is followed by the sultry and oppressive land-wind, which prevails till noon of the following day. In April and May the south shore-wind produces severe rheumatism. At Bombay the mean temperature is 85°; it is seldom above 100° or below 70°; the mean rain-fall is from 66 to 80 inches. At Delhi, 800 feet above the sea, the climate is dry, the rain-fall being only 20 inches. In the valley of Cashmere, 5000 feet above the sea, there is frost and snow in winter, and in July and August the thermometer rises to 80° or 85° at noon. At the Sanitarium of Darjeeling, 7500 feet above the sea, the mean annual temperature is about 50°—nearly that of London—and the rain-fall is 125 inches.

The diseases most prevalent in the lower districts are, among Europeans, dysentery, liver affections, fevers, and rheumatism; and among the natives, leprosy, elephantiasis, Guinea-worm, ophthalmia, and beriberi. On the delta of the Indus, and along the western and eastern shores of India, remittent fevers and dysentery are the chief diseases of Europeans; and from the valley of the Hoogley, along the shores of Aracan and Rangoon, they are endemic, and of frequent occurrence. Influenza is often very severe, and cholera comes every year in the delta of the Ganges towards the end of the hot season. Small-pox formerly committed great havoc, but of late the virulence of the disease has been checked by inoculation. Europeans have found great benefit from a temporary residence at the different Sanitaria established at elevated stations in the sub-Himalayas, the Neilgherries, &c. Darjeeling affords instant relief from acute diseases; cholera is hardly known there, and when imported it does not spread: liver and bowel diseases are equally rare;

and ophthalmia, elephantiasis, and leprosy are almost never seen; but rheumatism and ague are frequent, as well as violent and often fatal remittents.

The hill-countries of Gurwhal and Kumaon, at the foot of the Snowy Mountains, are visited by a pestilent disease termed "*Maha Murree*," or "certain death," which is described as resembling the plague of Turkey, and as being so infectious that any one afflicted with it who dared to leave his village or hut was shot like a mad dog. It commences with violent pains, succeeded by swelling of the body: it is generally fatal in 24 hours and is said to cut off 99 of every 100 attacked. Goître is prevalent in the valleys of the Himalaya, in the mountainous countries of Central Asia, and in the island of Sumatra. Diseases of the liver and bowels cause one-half of all the deaths among Europeans in India; fevers are slight. Liver disease is almost unknown among the indigenous population; and consumption, which is slight among Europeans, is scarcely ever met with among the natives. The average mortality among British troops for all India is 57 per 1000, and for native troops 18 per 1000, or less than one-third.

The island of *Ceylon* has a hot and moist climate; on the sea-coast the temperature ranges from 68° to 90°,—the mean being from 75° to 80°. The north-east monsoon prevails from November to February, and the south-west from April to November, and any interruption of their regular courses greatly increases disease. The east part of the island is hot and dry, the west more temperate and humid. The rain-fall is 85 inches at Colombo, and 120 inches in the hilly districts. The diseases of Ceylon resemble those of India. Small-pox is always more or less prevalent, and ophthalmia is common in the dry season. The army-returns show a mortality among the troops of 75 per 1000, or five times more than in Britain.

The climate of *Burmah* is comparatively healthy, but that of Aracan proved most destructive to the British troops in the campaign of 1824-1826, when in a short period from one-half to two-thirds perished. The chief maladies are fever, disease of the digestive organs, and cholera; consumption is said to be rare.

Malacca has an equable healthy climate—the thermometer ranging from 72° to 85°; it is but little affected by the monsoons, but there are regular land and sea breezes. The principal diseases are remittent fevers, with occasional outbreaks of cholera. Singapore is remarkably free from the

diseases of the surrounding countries. *Sumatra* has mountain chains rising to 15,000 feet above the sea, but its eastern portion is level or undulating, with marshy plains along the shores: temperature at mid-day 82° to 85°, but at sun-rise not more than 70°. Thick fogs, storms, and water-spouts are frequent off the coasts. *Java* is traversed by a mountain chain from west to east, about 1000 feet in elevation, with volcanic peaks rising to 10,000 feet: its north coast is low and marshy, and is lined with numerous small islands. The mean annual temperature at Batavia is 78.3°; winter, 78.1°; summer, 78.6°: at mid-day it rises to 80° or 90°, and at night it falls to 70°. Remittent fevers, dysentery, and cholera, are the principal diseases.

Borneo has low swamps and paddy-fields on the western shores, where dysentery prevails; the other diseases are remittent fevers and cholera, which latter are the diseases peculiar to the Moluccas; but Celebes, from its singular formation exposing it to every wind, is very healthy.

The *Philippines* have a hot moist climate, and are subject to severe storms. Winter, during the north-east monsoon, is the most healthy season. The mean annual rain-fall is 98 inches. The natives are healthy, and longevity is common. The principal diseases are intermittent fevers in low situations, chronic dysentery, elephantiasis, leprosy, and the *berba*, a disease characterised by swelling of the abdomen. Cholera was epidemic in 1842. Disease of the lungs is rare.

The coast of *China*, between the parallels of 20° and 40° north latitude, is most unhealthy, especially during summer and autumn, presenting throughout a humid atmosphere, a marshy soil, and a rank vegetation. The most peculiar complaints are dysentery and intermittent fevers, ending in remittent fevers, and sometimes complicated with scurvy. Intestinal worms are also very common. The small islands adjacent to the coast are equally unhealthy, and the diseases are of a similar kind. Yellow fever has not yet been observed, but cholera has been severe on the coasts, and in the islands of Amoy, Hong-Kong, Chusan, and at Manilla.

New Guinea, *Australia*, and *Tasmania*, are exceedingly healthy, and cholera has not yet appeared. New Zealand, as well as all the islands of the Polynesian Archipelago, are remarkably free from the more fatal maladies which infest the shores of Asia and Africa. The climate of Australia presents great variety. The mean temperature of spring is 72°, autumn 66°, winter 55°. In Sydney the thermometer is seldom below 40°, but at Paramatta it is frequently 27° in

winter. At Adelaide, South Australia, it ranges from 48° in July to 101° in January, and at Melbourne from 54° in June to 73° in January. The air is very elastic. The hot winds, supposed to originate in the deserts of the interior, raise the thermometer in the shade to 117° or 120°; they wither the grass, and frequently destroy the harvest, but do not appear to affect the health of man. The diseases of Australia resemble those of Britain, but they assume a milder type; the principal are those of the alimentary canal, the respiratory organs, the brain and nerves, and rheumatism. Dysentery is occasionally severe in South Australia, Victoria, in the Digging regions pre-eminently, and Moreton Bay; but not in Sydney. The only part of Australia at which remittent fever has been known to prevail is Port Essington, on the north coast. Typhus has been introduced by ships, but it loses its virulence. Ophthalmia is common in South Australia, and in 1847-8 epidemic influenza was fatal to European children and the aged, and cut off 15 per cent of the natives. Pulmonary consumption is scarcely known among the aborigines, but small-pox is prevalent. The mean temperature of Tasmania is about 70°, but during the hot winds from the north and north-west, it rises to 100° or 110°; the minimum is 31° in July. In the winter months, June, July, and August, frosts are occasionally severe in the high lands of the interior. The average number of rainy days is from 100 to 120, and the rain-fall 23 inches. The diseases resemble those of Australia, but the island is generally very healthy.

New Zealand. At the time of Cook's first visit, the islands were remarkably healthy, but since their intercourse with Europeans the natives have rapidly declined. In 1848 the deaths of Europeans in the hospitals amounted to only about 9½ per 1000. Catarrhal disease was very prevalent in 1849. Influenza, scarlatina, consumption, and scrofula have made great ravages among the natives, and rheumatism is also prevalent among them, but these maladies are rare and mild among the English. The islands are almost exempt from remittent and intermittent fevers, Epidemic scarlatina of a fatal type appeared for the first time in 1848. Small-pox and measles have not yet visited New Zealand, and vaccination is extensively practised. A strange disease called "Ngerengere" (*lepra gangrænosa*), formerly prevalent among the New Zealanders, is now rare.

Africa, in so far as is known, comprises the most healthy and the most deadly climates on the globe—the former at its southern extremity, and the latter on the west coast.

Algeria, on the north coast, is traversed by the Atlas Mountains, which rise to 7000 feet above the sea; on their northern slopes the climate is temperate and healthy, but it is pestilential in the marshy plains. The heat is often excessive under the influence of the *simoom*, or hot wind of the desert. In 1846 there were fifty-six storms. The most fatal maladies are diarrhœa, dysentery, and liver disease.

On the *west coast* of Africa the shores and estuaries of rivers are low and marshy: the chief characteristic of the climate is excessive moisture, the average annual fall of rain at Sierra Leone being 189 inches, and the mean temperature 81°. The rainy season extends from June to September. After the rains, dense masses of vapour termed the "smokes," envelope the land for days together, and are often driven to a considerable distance seaward. The temperature of the inter-tropical portion, from the Gambia on the north to Benguela on the south of the equator, is remarkably equable, the general range of the hottest period being from 80° to 86° in the shade on board ship, while at the extremities of the station in the winter months it is seldom below 58°; but sudden changes from excessive heat to cold, with chilling fogs, are frequent. Every part of this coast, and the adjacent islands between the tropics, is most deleterious to the health of Europeans, but much of the excessive mortality recorded there has been the result of imprudence.

The most fatal climatal diseases are remittent fever and dysentery. July to October, the rainy season, is the most unhealthy; from November to April fever is comparatively mild. Dysentery is most prevalent, both on shore and in ships, in the southern division of the station, probably owing to the use of the waters of the Congo river. It is frequent in all seasons at Ascension, but is not endemic at Sierra Leone. Inflammation of the liver is less prevalent here than in India, and consumption is little known. Among the natives, especially in slave-ships, the prevailing diseases are dysentery, fever, small-pox, rheumatism, lethargus, or "sleepy dropsy," and ophthalmia. Of the white troops who garrisoned the stations at Sierra Leone in 1824, two-thirds died in a year, and few lived to complete twelve months in the command. The annual mortality among the black troops is only from 2 to 3 per cent. The Guinea worm infests the negroes, or others who have resided some time on the Gold Coast, or on the shores of the Bights of Benin and Biafra. Yaws and craw-craws are also prevalent among the natives.

The climate of *Loango* is fatal to Europeans; its chief

maladies are remittent and intermittent fevers. St. Paul de Loando has a climate intensely hot; fevers prevail, and ague and small-pox occur among the natives. Benguela is reported the most sickly of the Portuguese stations south of the equator: the heat is here excessive, and water deficient. The southern portion of Africa, beyond the tropic on both sides, is remarkably free from remittent fevers.

In the *Cape Colony* the climate may be termed temperate, the mean temperature is 67°, and the range is from 50° to 80°. Sudden changes are common, a veering of the wind from north-west to south-east often lowering the temperature 40° in one day: and the hot winds in May, June, and July, frequently blow with the violence of a gale, and raise the temperature 20° in course of a night; but this apparently does not injure health. The country is eminently healthy, and cannot be said to have any peculiar diseases. Dysentery sometimes attacks new immigrants, and many of the Hottentots die of consumption, and present cases of leprosy. Diseases of the stomach and bowels are general, and rheumatism is severe and very prevalent; but fevers are of rare occurrence.

In *Kaffraria* and *Natal* winter is the dry season. From May to August it seldom rains: in summer the rainy season sets in with terrific thunderstorms. In spring the temperature of the plains is seldom above 50°, in summer it is between 70° and 90°, and before storms it often rises to upwards of 100°. The country is remarkably healthy.

Madagascar is visited by pestilential fevers and dysentery on the west coast, and by aggravated skin-diseases in the interior.

Mozambique has long been notorious for its pestilential diseases. From Delagoa Bay to Magadoxo remittent fever and dysentery prevail at all seasons along the coasts of Zanguebar, and extend a considerable way inland, but the more elevated portions of the country of the Imaun of Muscat are said to be healthy.

From the equator to the Strait of Bab-el-Mandeb, and along both shores of the Red Sea, remittent fever prevails in the marshy districts, at the mouths of large rivers. Remittent and intermittent fevers, dysentery and ophthalmia, are prevalent in Abyssinia.

Egypt. The climate of the upper part of the Nile Valley is characterised by extreme dryness. The temperate season lasts from October to March, and the hot season from March to September. In summer, the heat during the day is excessive, owing to the confined position of the country and the

low level of its surface, but the nights are cool and agreeable. In winter the weather is mild and pleasant. At Cairo the mean temperature of the year is 72°.2, winter 58°.4, summer 85°.1; and at Kenneh the mean is 79°.9, winter 63°6, summer 92°. Upper and Middle Egypt are more healthy than the Delta. The annual inundation of the Nile commences in June, and attains its maximum height in September. After remaining stationary for some days, the waters again subside, when fevers, dysentery, and ophthalmia prevail over the whole country. The plague is endemic in the lower province, seldom passing south of Siout, on the Nile. North and north-west winds blow permanently during the progress of the sun towards the tropic of Cancer; but on his return to the tropic of Capricorn, it varies between south-east and west. At the spring equinox the pestilential hot wind, called the *Simoom* or *Khamsin*, blows from the south-south-west for fifty days. During this period the diseases peculiar to the country assume their greatest virulence. The *mirage* occurs on the extensive plains after the surface has been heated by the sun; the country then appears like a vast lake studded with islands. Rain is unknown in Upper Egypt; in the Delta it falls frequently from November to March. Showers are slight and infrequent at Cairo; the average number of rainy days there being thirteen in a year. Snow never falls except in the vicinity of the coast, and then in very small quantities.

America, North.—The great characteristic feature of this division of the so-called New World is its vast interior valley, extending from the Gulf of Mexico to the Arctic Ocean, and presenting every variety of climate between the tropical and the polar regions. This valley is cut off from the genial influences of the Pacific Ocean on the west by the Rocky Mountains, and from those of the Atlantic Ocean on the east, but in a less degree, by the Alleghanies. It is traversed by a deep winding longitudinal depression, forming the trough of the Mississippi for more than 2000 miles. The climate of the north-eastern States is variable, with extremes of summer heat and winter cold, while the southern States enjoy more of a tropical climate. The Pacific coasts are milder, and in the north more moist than those of the Atlantic. The following examples show the decrease of temperature and rain-fall in proceeding from south to north:—

Places.	Latitude.	Temp. of Year.	Annual Rain in inches.
New Orleans	29·57	71·32	52
Cincinnati	39·06	54·25	47
Washington	40·22	53·13	34

Throughout the eastern half of North America, especially its middle latitudes, there are but three characteristic winds:—1. A damp and chill current from the north-east, visiting the whole Atlantic sea-board and the interior to about lat. 35°;—2. A south-west wind, extending from the Gulf of Mexico and the table-lands of the continent, the whole way to the basin of the St. Lawrence, and even past it; and—3. A continental wind from the north-west, dry and cool, and very pure. The north-east wind blows on the fewest number of days in the year, except upon the north-east Atlantic coast, where it is very frequent. In the southern half of the country the south-west wind predominates, especially in summer and autumn; and in the northern half the north-west wind is in excess, particularly during winter and the latter part of autumn. Of the relations of these winds to disease, it may be stated generally, that the north-east is the *catarrhal* wind, disarranging most the respiratory organs; the south-west wind the *malarial* wind, disturbing most the functions of the liver; and the cool, dry, continental wind from the north-west is by far the most salubrious breeze on the continent, tending to repair the mischief done by the others, especially by the south-west.

In Louisiana the most fatal disease is the congestive form of fever, called the *cold plague.* Diarrhœa and dysentery prevail extensively, mostly south of the 40th parallel of latitude, and the dengue, "breakbone" or "dandy" fever, is prevalent as an epidemic in the southern states. The same fever was observed at Rangoon and Calcutta in 1824, at Burhampore, etc., in 1825; the island of St. Thomas, West Indies, in 1827; and New Orleans in 1828. A remarkable endemic disease, termed the *milk sickness,* is peculiar to the western portion of the United States, being seldom or never observed to the east of the Alleghanies.

The mainland of North America, from the tropic of Cancer to Behring Strait on the Pacific side, is free from endemic diseases, but yellow fever has of late years appeared on the south-west coasts. From the parallel of 46° or 47° north to the polar regions, the inhabitants, with the exception of exanthematous diseases (eruptive fevers or rashes) and influenza, enjoy the most perfect immunity from the endemics and epidemics which infest the tropical regions. The Esquimaux have few ailments, and typhus fever and consumption are all but unknown in the arctic regions. Cholera first appeared in the ports of the United States in 1832.

Oregon has a climate well suited to the white race. The

western section is mild and equable, resembling that of England; south and south-west winds prevail on the coast; the middle section is dry and changeable, the temperature varying from 9° in January to 108° in July. In the eastern section, the temperature fluctuates 50° or 60° in a few hours. No ague nor fevers were known to exist prior to 1830, but since then they have committed frightful ravages amongst the Indian population.

California is much milder in its climate than the corresponding countries on the Atlantic side, with short winters. At San Francisco the temperature is seldom above 80°, and rarely falls below 40° in the rainy season. Fogs are frequent in summer, from north-west winds. Snow is seldom seen on the coast. The sheltered valleys enjoy an excellent climate. In the valleys of the Sacramento and San Joaquim, the mercury often rises to 100° or 120°, and the air is extremely dry. The white population is exempt from climatic diseases, but in 1839 small-pox carried off one-half of the aborigines.

Mexico is traversed by the mountain chains which connect the Andes and the Rocky Mountains. These separate and enclose the table-land of Anahuac, 6000 to 8000 feet above the sea. The *Tierras Calientes* (hot lands) extend from the coast to about 900 feet above the sea; *Tierras Templadas* (temperate), 4000 to 5000 feet; and *Tierras Frias* (cold) above 7000 feet. The mean temperature of the coasts between the parallels of 15° and 20° is 76°, while on the elevated plains it is only 64°. The shores, especially those of the Gulf of Mexico, are excessively hot, humid, and unhealthy; while the plains of the interior, 3500 to 4500 feet high, have a temperate and perfectly healthy climate. The annual rain-fall at Vera Cruz is 185 inches. All the higher regions of Mexico are extremely healthy; fevers are confined to the coasts. The *Matlazuahuatl* is a disease peculiar to the Indians; it resembles yellow fever. Small-pox was introduced into Mexico in 1520, when it destroyed one-half the population. In 1799 it destroyed in the city of Mexico alone upwards of 9000 persons.

The state of *New Mexico* is extremely salubrious. The annual range of temperature is from 10° to 75°, and the rainy season from July to October. Bilious diseases, the scourge of the Mississippi valley, are almost unknown here, but an epidemic fever, of a typhoid character, ravaged the country in 1848-9; and this, together with small-pox, which prevailed epidemically in 1840, carried off 10 per cent. of the population.

In *Central America* the climate is remarkable for its variety of temperature produced by difference of altitude, and its equality during the different seasons of the year. On the south-west coast the rainy season begins in May and ends in October. During the rest of the year rain is almost unknown. On the north-east coast the rains continue nearly all the year, the driest period being from June to October, and the wettest from October to May. The excessive moisture renders the north-east coast very unhealthy, while the rest of the republic is, considering its position, comparatively salubrious. On the table-lands (*los Altos*) the temperature is mild, and in the higher stations it is excessively cold. In Guatemala the temperature is seldom above 80° or below 50°. Many of the largest towns, as Sonsonate and San Miguel, being little above the level of the sea, have an oppressively hot temperature of 80° or 90° at all seasons. Honduras has a very unequal surface, and the capital town, Comayagua, has a hot climate; but many parts of the interior have a fine temperate climate, similar to that of Southern Europe. Belize is reckoned more healthy than most of the West India islands: the mean annual temperature is 80°: rains are frequent in July, August, and September. Omoa and Truxillo, on the north-east coast, have an excessively hot and unhealthy climate. Yellow fever occurs on all the coasts of the Mexican Gulf, and goître is prevalent in the mountainous districts. At Porto Bello the "vomito negro" has often nearly depopulated the place.

West India Islands. The space between the equator and the parallel of 40° north, including the shores of the Caribbean Sea, the Gulf of Mexico, and part of the Atlantic shores of the United States, with all the West India islands, is the true domain of yellow fever. Remittent fevers also, the endemic of hot countries, and dysentery, prevail at all seasons, occurring most frequently in marshy places. This is, besides, the region of hurricanes, and the theatre of many epidemic diseases. But although all the islands are included within the pestilential limits, they present a great variety in their comparative liability to and exemption from particular forms of disease.

Cuba. The climate is changeable and cold during N.N.W. winds. The hottest months are July and August, when the temperature is 82° or 84°. In the coolest months, December and January, it falls to a mean of 63°. The average of rainy days at Havana is 102. The mean annual fall of rain is 45 inches. Hurricanes recur every second year, in September

and October. The towns on the coast are inimical to the health both of the black and white population: the western portion of the island is the most unhealthy, and the central least so. The greatest mortality occurs between the years of twenty and thirty, the age at which the greatest number of immigrants arrive. The most fatal months for the Creoles are March, February, January; the least so, November, December, June. The most fatal months for Europeans are June, July, August, May; and the least so, January, February, March, November, and April. Intermittent fever prevails along the rivers of Cuba, but yellow fever does not extend to the interior.

Porto Rico has a climate generally more healthy than the other islands of the Antilles. Cholera broke out in December 1855, and extended over eight towns.

In *Jamaica* the climate varies greatly at different elevations. At Kingston the mean annual temperature is 80°, while at Pleasant Hill, 4000 feet above the sea, it is from 52° to 65°. The amount of rain at some seasons is very great, varying from 70 to 100 inches. In the mountains the climate is peculiarly healthy, and they are now a favourite resort for American invalids. The chief diseases are yellow fever, remittent and intermittent fevers, diarrhœa, dysentery, rheumatism, and influenza. The negroes suffer from ulcers and *yaws*, a species of leprosy. Cholera appeared for the first time in October 1850, at Port-Royal, thence it spread over different parts of the island. It is calculated that in 1850-51, a fifth part of the population was attacked with the severe form of the disease, and the deaths are estimated at from 30,000 to 50,000. Yellow fever, in its most virulent form, appears very frequently at Port-Royal.

Barbadoes.—Climate equable, and comparatively dry; temperature from 77° to 84° Fahr.; annual rain-fall 72 inches; prevailing wind north-east. The island is subject to terrible hurricanes and earthquakes; thunderstorms are frequent and severe. It, as well as Antigua, is frequently visited by yellow fever of a severe type.

St. Lucia.—Temperature of the year from 75° to 90° Fahr.; annual rain-fall, 84 inches. The island has long been noted for its insalubrity, the chief diseases being fevers, and diseases of the stomach and bowels.

St. Kitt's is extremely dry, and comparatively healthy.

Tobago.—The climate of this island is healthy, on account of its narrowness, and the regularity of the land and sea

breezes. The thermometer ranges from 75° to 90°. Fever is prevalent.

Trinidad is in general healthy, but fevers are severe. The thermometer ranges from 70° to 85°, and the fall of rain is 75 inches. The hot and rainy season extends from June to October, but hurricanes are unknown.

Bahamas.—The climate is equable, the temperature varying from 73° to 93° Fahr. The islands are resorted to by Americans afflicted with pulmonary complaints. Cholera has never visited the Bahamas.

The *Bermudas* are generally healthy; the thermometer from 60° to 70° Fahr. In 1842 epidemic influenza raged with great violence among the white population, but the blacks were very slighly affected. Rheumatism is prevalent, and dysentery and yellow fever prevail occasionally. Remittent fever is not severe.

Canada.—The climate of this vast country varies according to position and elevation. It is everywhere liable to sudden changes. In the eastern province the winter is more severe than in the west, but the clear blue sky, and the absence of fogs, indicate its great salubrity. The mean annual temperature of West Canada is 48.37°; and of East Canada 42.1°. The annual fall of rain is nearly the same as on the east coasts of Great Britain. At Quebec the mean winter temperature is 14.2° Fahr.; but it is sometimes as low as 60° below the freezing-point. The prevailing winds are westerly. The severest winters are accompanied by north-east winds. The heat of summer is less relaxing, and the cold of winter more bracing, than in the United States. As the country becomes cleared, and has its swamps drained, its inhabitants may hope to enjoy a climate as salubrious as that of Britain. During the *Indian summer*, in November, the temperature is mild and serene, with a hazy atmosphere. The principal diseases are ague and typhus fever; the former most prevalent in Western and the latter in Eastern Canada.

Newfoundland.—The climate is less severe than in Canada; the frost is less intense, and snow does not lie long on the ground. It is subject to dense fogs, chiefly in May and June, but these do not appear to injure the health, and the climate is remarkably salubrious. The chief diseases are those of the lungs, catarrhs, and phthisis; next, those of the liver and of the stomach and bowels, fevers being small in proportion. The mortality, according to population returns, is only 1 in 76; but the return of the troops in the station is much less favourable.

Nova Scotia.—Climate very moist; fogs are common along the coasts in May and June; changes of temperature sudden and extreme; range of thermometer, 6° or 8° below zero in winter, to 88° in summer. The air is highly salubrious; the inhabitants enjoy a remarkable degree of health, and an almost total exemption from the intermittent and remittent fevers of Canada and the United States.

Cape Breton has a similar climate, and is even more healthy, no epidemic disease, except small-pox, having been known for many years previous to 1834.

Prince Edward Island has a more severe winter, the thermometer being often 20° to 25° below zero; and the rivers and bays are frozen till the end of April. The army returns show a mortality of 14 per 1000, the chief maladies registered being diseases of the lungs, fevers, and rheumatic affections. Epidemic cholera did not visit Nova Scotia or New Brunswick in 1832, when it raged in Canada, but it appeared at Halifax in July 1834. It did not extend beyond the limits of the town. In 1849 the course of cholera in British North America was nearly the same as in 1834.

South America, from its peculiar formation, having a girdle of lofty mountains along its western side, and no corresponding continuous chain in the east, discharges nearly all its waters eastwards to the Atlantic Ocean, through the great basins of the Orinoco, the Amazon, and the Rio de la Plata. In general the climate of South America is colder, and more moist than the corresponding portion of the Old World. Among the causes which produce this effect, Humboldt assigns the extension of the narrow part of the Continent towards the south pole; the expanse of ocean over which the trade-winds blow; the flatness of the eastern shores, and the current of cold water on its western coasts; the lofty mountain-chains, whose snow-clad summits cause currents of cold air to roll down their declivities; the numerous large rivers, which, after many windings, seek the most distant shores; the grassy steppes, which are not susceptible of acquiring a high temperature; and the impenetrable forests, near the equator, screening the alluvial soil from the direct rays of the sun, and exhaling vast quantities of moisture.

Venezuela has a hot dry climate along the shores of the Caribbean Sea, but Caraccas, 2,822 feet above its level, is healthy. The table-land near the coast has an annual temperature ranging only from 70° to 80°. In the Llanos, or plains, the climate is unhealthy.

British Guiana is excessively moist. In 1830 it rained continuously, except during September and October. In 1831 the rain-fall at George Town was 157 inches. The mean annual temperature is 81°, max. 90°, min. 75°; nearly the same in Demarara and Berbice. It is not subject to hurricanes. The most unhealthy season is from June to October. The chief maladies are intermittent and yellow fevers, stomach and bowel complaints, and disease of the lungs. Spleen diseases are common as a consequence of intermittent fever, especially among immigrants. Yaws, an African malady, common during the time of slavery, has almost entirely disappeared, and the same may be said of leprosy. Elephantiasis is very common among the coloured population.

Brazil has, on the whole, a mild and healthy climate. The rainy season commences with thunder-storms in October, and lasts till March. The mean temperature at Rio is 72°. The clearing of forests here has reduced the amount of rain so as to render the water supply deficient. Para, formerly remarkably healthy, and free from epidemics of any kind, was visited by yellow fever in February 1850: its period of greatest malignity was during April, when the deaths in the city were twenty to twenty-five per day. About the same time in the following year, yellow fever having greatly abated, small-pox broke out with great violence; and by these two diseases about 25 per cent. of the population was carried off. Cholera appeared for the first time at Para in May 1855, it reached Bahia in the middle of July, Rio de Janeiro on the 20th of the same month, and Pernambuco in February 1856. At Rio the whites died at the rate of 1 in 126 of the population, while among coloured people the proportion was 1 in 52. The climate of Para is delightful, but its filthy condition is a fertile source of malaria. At Santarem, in the province Para, elephantiasis and leprosy are common among the poorer classes. Bahia was long celebrated for its general health, and its freedom from cholera, influenza, and dysentery; but it also was visited by yellow fever for the first time in November 1849, although a similar epidemic is said to have been observed at Bahia and Pernambuco, between 1612 and 1686. A species of typhus, termed *febres malignas*, commencing as ague or remittent fever, is prevalent on the coasts of Brazil, and cretinism and goître are common in the mountain valleys of the interior. Elephantiasis, or the "Barbadoes leg", is still frequently met with, although it is decreasing among the white population; and the frightful malady termed *elephantiasis Græcorum*, or tubercular elephantiasis, a

species of leprosy, is common at Bahia, where there is a hospital for lepers. Insanity, nervous and pulmonary diseases, formerly rare, are greatly on the increase since the independence of Brazil. Hepatitis, though not so general as in other hot countries, is also on the increase.

Paraguay is described as generally very healthy, its tropical heat being modified by the inequality of its surface; yet it is occasionally ravaged by the most fatal maladies. In ten years previous to 1840, 20,000 persons died of dysentery; from 1836 to 1838, 11,000 died of scarlet fever; and in 1844-5, 14,000 died of small-pox, in a population of about 200,000.

Buenos Ayres has a climate esteemed one of the healthiest in the world, and instances of longevity are common. The *pampero*, or south-west wind, is often a hurricane, bringing clouds of dust from the parched pampas, and causing complete darkness, which lasts for half an hour in the middle of the day; and the *viento norte* (north wind), is very severe, producing great irritability and headache, chiefly among the native women. Small-pox formerly cut off thousands of Indians, and its ravages are still very severe among them; but it has been greatly arrested by vaccination. Intermittent fever is hardly known. The most fatal diseases in the hospital in 1828 were consumption, fever, and inflammation of the liver.

At the *Falkland Islands* the climate is more equable than in England; the temperature ranges from 30° to 50° in winter, and from 50° to 75° in summer; snow seldom lies on the ground more than half an inch thick; rain is frequent, but mild. The prevailing winds are north-west in summer, south-west in winter. The islands are very healthy; no peculiar disease has appeared, and residents afflicted with pulmonary complaints are said to experience relief.

On the west or Pacific coast of South America, remittent fever, but not of a severe type, extends from Panama to near Lima, latitude 12.3° south, and yellow fever has appeared on the coast as an epidemic several times; but the Galapagos Islands, near the centre of this district, have escaped these maladies, and are remarkably healthy.

New Granada has an extremely varied climate; at Honda, 1000 feet above the sea, the heat is intense. Mompox has a dense moist atmosphere, and goître and malignant ulcers prevail. At Cartagena the yellow fever is endemic, but in the elevated regions of the Andes the air is highly salubrious, with a temperature of 55° to 70°. On the coasts of Ecuador at Guayaquil, the country is inundated during the rainy

season in July, after which it remains for some months a pestilential marsh; here yellow fever has appeared several times. At Quito, 9,543 feet above the sea, there is perpetual spring, with a mild and equable and healthy temperature, but it is disturbed occasionally by violent winds and devastating earthquakes.

Peru has a hot and dry climate on the Pacific slope, where rain never falls, but it is tempered by the numerous streams which descend from the mountains, by the "garua" fog, and by the current of cold water from the Antarctic Ocean. The prevailing winds on the west of the Andes are south-west and south, which are dry and cool, but on the east the regular easterly trade-winds from the Atlantic are loaded with moisture, and pour down on the slopes of the mountains a copious, and in many places a perpetual rain. In the mountains, at the height of 3,000 to 5,000 feet, the temperature is mild, equable, and healthy, and the inhabitants are noted for longevity. At Huanuco, 5,946 feet above the sea, no chest-affection is known to originate, and the city is resorted to by consumptive patients from other places. Dysentery, and a putrid fever called *tobardillo,* are the commonest maladies, and goître is prevalent, especially among the women. At Lima, 453 feet above the sea, the mean temperature of the year is 73.3°, winter 68.1°, summer 77.6°. The climate is pleasant, and it was formerly reckoned healthy, although the mortality was always excessive from neglect of sanitary measures. Yellow fever has recently appeared, and ague prevails along the entire coast of Peru, at all seasons, and among all classes of the population.

Bolivia has three regions of climate,—the *Pano,* high and cold, including the district of Lake Titicaca, 12,846 feet above the sea; the *Paramo,* temperate; and the *Yungas* or valleys, hot. The table-land has clear skies for nine months of the year, and three months of rain. The higher regions are healthy, but fevers prevail in the valleys.

Chile has in its central districts a hot dry climate, the thermometer in summer rising to 90° or 95°; on the coast it is finer and more temperate; ice is sometimes seen in winter and spring. Rain falls between June and September south of Copiapo; it is irregular, and often very heavy. Goître is prevalent in the Andes, especially in the province of Mendoza, but otherwise the climate of Chile is noted for salubrity.

The regions of *La Plata,* and the northern and eastern frontiers of *Patagonia,* are characterised by extreme dryness, for the rains carried by the prevailing winds from the Atlantic

are exhausted before they reach the interior plains, while those brought by the south-west winds are arrested by the Andes on the west coast of Patagonia, which is excessively moist. Goître is not known to extend further south than about latitude 44°.

EPIDEMICS.

Diseases of this class are to a great extent limited to the regions of their birth, and in this respect are to be considered as endemic; but they make occasional outbreaks at longer or shorter intervals, and extend over a greater or less extent of surface. In quitting the regions of the torrid zone, or countries having a tropical climate, they lose their intermittent type. The entire class has certain marked peculiarities by which it is distinguished. They always attack a great number of persons at once; they all bear the characteristics of fever; and each resembles the other in having a certain range and a periodical recurrence. It has been ascertained that nearly every epidemic on record was preceded by influenza. Some of these diseases, as yellow fever, are peculiarly fatal to those who are strangers to the soil; while others, as cholera, attack the native and the unacclimatised alike.

1. *Yellow Fever.* The first trace of this formidable malady was observed, at the end of the fifteenth and beginning of the sixteenth century, at San Domingo and Porto Rico; on the continent of South America, and on the Gulf of Darien, at which latter place it prevented the Spaniards from settling. From 1544 there is no record of the disease having broken out anywhere till 1635, when it appeared in Guadeloupe. Thenceforward it occurred at irregular intervals. In the seventeenth century it spread along the continent of South America to latitude 8° south, and in North America to latitude 42° north, but only on the eastern coasts of both. The first notice of it on the Gulf of Mexico was at Biloxi Bay in 1702, and Mobile in 1705. The next was in Pensacola and Mobile in 1765, where it prevailed as an epidemic. In the eighteenth century it appeared on the west coast of South America to latitude 2° south, North America again to latitude 42° north: in Europe, and even in the islands of the Pacific, and in Madagascar. At the beginning of the nineteeth century it extended, in North America, to latitude 47°, in Europe to latitude 48° (the Canary Islands and Leghorn), and penetrated deeper into the American continent than formerly. "Ever since yellow fever attracted attention, or

was recognised as a distinct disease from the remittent autumnal fevers of the temperate zone, it has prevailed as an endemic at Havana, raging epidemically from April to December, and occurring sporadically throughout the remainder of the year." From time immemorial it has been indigenous at Vera Cruz, on the Gulf of Mexico. Here its chief victims are strangers who come from colder regions during the hottest season, as well Europeans as those natives who quit the interior for the coast region; and hence it is termed the "strangers' fever". The yellow fever is a disease of hot weather, requiring for its manifestation a high mean temperature. It never appears in any climate where the temperature falls below a certain average. It has often prevailed in almost every town on the Mississippi up to Vicksburg, latitude 32°.24′ north, but has never, except once, reached Memphis, in latitude 35°. It occurs with an early hot summer, when the rain is not copious enough to flood the marshes; but heat alone is not sufficient to engender it.

Among causes hitherto little adverted to, but which by some authors are held to be essential to the production of this fever, is a certain degree of density of the population. Thus Jörg affirms, from personal knowledge and the observation of others, that this fever never occurs in the country or in small villages, but always in large cities, or smaller towns with great trade.

Since this disease is dependent, in a great degree, on an elevated temperature, its occurrence is necessarily limited to the tropical regions, or to countries having a tropical climate. Within these prescribed limits in many places the exciting causes seem to exist, but still the fever has never or seldom shown itself. Its proper seat is the West India Islands and the Bahamas, with portions of the adjoining continents of North and South America. From Brazil to Charleston in one direction, and from Barbadoes to Tampico in another, the exciting causes are in constant though unequal force, depending on different seasons and localities. The fever prevails often, though not generally, in places north of Charleston; visits occasionally the Atlantic cities of the United States, and has ascended as far as Boston; while in the Mississippi Valley it once appeared as high as Memphis. In an eastern direction, but within the same parallels, it has extended to Cadiz, Xeres, Carthagena, Malaga, Alicant, Seville, Barcelona, and other cities on the coast and in the interior of Spain. It has prevailed several times at Gibraltar, once at Rochefort, once at Lisbon, and once at Leghorn. It

reaches to between latitude 22° or 23° south of the equator, and to 42° north on the Atlantic coast: to 35° on the western waters of the interior, and to 8°.56 on the Pacific. In longitude it extends from 60° to 97° west, or, including Europe, to longitude 10° east. Until recently, the river Amazon formed its boundary south of the equator; but since 1850 it has invaded Rio Janeiro, Bahia, Pernambuco, and other parts of Brazil. On the Pacific it only appeared once at Panama, twice at Guayaquil, and once at Callao. It does not appear in the East Indies. It has never prevailed in China, Cochin-China, Singapore, Siam, or Ceylon; it prevails only occasionally on the west coast of Africa, Senegal, and the Gold Coast; and has been only three times in eighty years at Cayenne.

From a similar cause, decrease of heat, the yellow fever never appears beyond a certain elevation. At Xalapa, in Mexico, on the same parallel as Vera Cruz, but 4,330 feet above the sea, it is unknown. Maroon Town, and the Phœnix Park, Jamaica, are noted for healthiness, and while the pestilence of yellow fever rages in the low grounds and along the coasts, cutting off thousands annually, these elevated regions enjoy a complete immunity from its effects; for that bane of European life has, according to Major Tulloch, never been known, in any climate, to extend beyond the height of 2,500 feet. The inner Cabrite 430 feet, and the outer Cabrite 590 feet in elevation, are also remarkably healthy. In the island of Grenada, Mount Cardigan, 500 feet, and Richmond Heights, 730 feet, are not sickly. Mount Desmoulin, near Roseau, in the island of Dominica, 1,500 feet above the sea, has invariably been free from yellow fever. The same immunity has been observed in San Domingo, in the mountainous parts of which, whatever be the nature of the soil, this disease does not prevail. In the United States the yellow fever is never known to prevail in very high situations, whatever be the condition of the localities; but at what point it ceases to appear or prevail, is still an unsettled question. The disease varies in intensity, and in the numbers attacked, according to latitude. M. Moreau de Jonnés shows, by elaborate statistics, that in the United States the mortality amounts to one-half of those attacked, while in Spain it is limited to a third or a fourth of the total number. This is accounted for from the difference of climate and soil between Europe and America, which in winter is so extreme, that in order to find in Europe a cold as intense as that of the United States, it would be necessary

to remove 12° or 14° farther to the north. The portion of the United States visited by yellow fever has more rivers than Europe, in an equal extent of territory. The more southerly part of it is flat, generally sandy, and covered with the long-leaved pine. Large rivers descend from the Alleghanies; many of them are muddy, and their banks submerged during six months in the year; and the swamps thus formed are covered by thick forests of cypress and other trees. In these marshes rice-fields are established, and it is during the rice harvest in September that the autumnal intermittent fevers appear, by which nine-tenths of the white population are attacked. Of the twelve principal ports of the United States, proceeding from south to north, the first nine, viz., New Orleans, Mobile, Savannah, Charleston, Wilmington, Norfolk, Baltimore, Philadelphia, and New York, unite, in different degrees, the three principal causes of yellow fever; and, consequently, the disease may occur in either or all of them; while in the other three, New Haven, Boston, and Portsmouth, one cause—a great intensity of heat—is wanting, and hence the disease is not often manifested there.

However violent the disease may be at New Orleans, Savannah, or Charleston, no new case ever appears from the day on which it freezes even a single degree. This usually occurs, in the middle States, from the 25th to 30th October, and in the Southern States a month later. It often happens that in the Southern States the disease does not appear at all, if the summer has had frequent alternations of moderate temperature, owing to the occurrence of storms or refreshing rains.

The cessation of yellow fever with the approach of cold weather is so well known, that the farmers of Georgia and and the two Carolinas, who, for security, remain in the country during the hot season, hasten to market with their produce about the beginning of November. They encamp within two or three miles of Charleston, where they wait with the greatest impatience the first appearance of frost, after which, with a feeling of perfect security, they enter the city in a mass, creating the utmost activity in the streets, which, a short time before, were nearly deserted. The more wealthy inhabitants of the Southern States quit the country during autumn to escape intermittent fevers, and the cities to avoid the yellow fever, and spend the sickly or hot season in the Northern States. During the months of December, January, February, March, and April, the lower portions

of the Southern States, and their seaports, are extremely healthy.

It is truly astonishing how limited the seat of yellow fever is, and how securely a stranger may live quite in its vicinity if he does not enter the infected circle. La Roche says that the immunity is complete in towns, at short distances from the spot where it is raging. In the pure air of the country it never occurs, however close the intercourse with an infected city; and Drake says, "yellow fever is essentially a disease of towns and cities—an epidemic invasion of the country is unknown." The little town of Guanobacoa, within a few miles of Havana, and with which it is in constant communication, is said never to have had a case of the epidemic; and even in the nearest country-houses around Havana and Casa Blanca, strangers are perfectly safe while the disease is raging in the towns: this exemption is confirmed in the history of the disease at New Orleans, Charleston, Vera Cruz, Matanzas, St. Jago de Cuba, etc. Instances of exemption, even in considerable towns, occur where most unexpected. The town of Cardenas in Cuba, with a population of 3,000, built in a marsh on the north coast of the island, and nearly surrounded by swamps, has never had a single case of yellow fever. Trinidad, in Cuba, has only been subject to the epidemic since its population amounted to 5,000; here, and at Puerto Principe, it appears only at intervals of many years. Matanzas has no marsh, but is situated on nearly dry rock: so long as it was a small place, it had no yellow fever, but now that it has a population of 17,000, has a large trade, and is surrounded by vegetation, it has yellow fever at intervals. New Orleans, although built on piles in a swampy site, has sometimes an interval of exemption during four or five years consecutively; such is also the case with Charleston, and Savannah is seldom visited by the epidemic. In the West Indies the greatest mortality occurs among poor Spaniards from the Canary Islands, Germans and Irish, who have no means of comfort or medical aid. In Havana, sailors are the greatest sufferers, partly from exposure, hard work, and irregular living. Ships which arrive in ballast, and lie long in harbour, are generally the most healthy: coal and sugar laden ships are the least so. In the period of life between 14 and 25 it is calculated that the cases of yellow fever are twice as numerous as at any other age. From 25 to 40 they are still frequent—beyond 40, cases are of rare occurrence; children under 15 are almost exempt: and females are, in proportions, less frequently attacked, and escape more easily than men.

2. *Intermittent Fever, or Ague.* This, the specifically purest form of malarial disease, is an endemic of all warm climates. It has its base within the tropics, and extends northwards till it is arrested by decreasing temperature. Local malaria is the first and most necessary condition of the endemic and epidemic form of the disease, and always exists where the malady prevails, although the peculiar state of the climate and soil may not be clearly ascertained. Intermittents are very prevalent in the West Indies, and in the interior valleys of North America, but are almost unknown in Nova Scotia and the New England States on the Atlantic seaboard. In Europe, ague is endemic on the coast of the Gulf of Bothnia, beyond lat. 62° north. In the interior valley of North America, intermittent fever is the prevailing malady. From its occurring constantly within the tropics, but ceasing far south of the polar circle, it appears that a high temperature is a condition necessary to its production, but this can only be considered as an exciting cause. It is found that a summer temperature of 60° is necessary to the production of the fever, and that it will not prevail as an epidemic where the temperature is below 65°. It therefore occurs in winter at places where the season has a mean temperature of 60° or upwards, as at Vera Cruz, Tampico, Havana, etc.; but at New Orleans, and generally under the thirtieth parallel, where the mean winter temperature is under 50°, the fever is suspended. At New Orleans the necessary heat exists for nine months of the year—March to November ; at St. Louis, five months—May to September ; at Montreal, four, and Quebec, three months. A continuance of more than two months of a heat equal to 60° is necessary to its development ; hence it prevails more in October than April, though their mean temperatures are nearly the same, and its greatest prevalence in every latitude is generally some weeks after the hottest months of the year. It is rarely directly fatal, but frequently results in liver disease and dropsy. The western area of the disease is limited in America on the east by the range of the Appalachian Mountains, into the very gorges of which it ascends, by the valleys which penetrate their flanks : while that of the seaboard extends inland to the eastern base of the same range. South of lat. 33°, where this barrier terminates, its eastern limit is the Atlantic Ocean. On the south-west its boundaries are the Cordilleras of Mexico and the southern Rocky Mountains. It is almost unknown three hundred miles beyond the western boundary of the States of Missouri and Iowa, and above lat. 37° north. On the north it ceases to

prevail as an epidemic at lat. 44°, and it does not occur even sporadically at lat. 47°. In Western Europe its limits include Scotland, and on the Continent it extends to the mouth of the Angermann river, lat. 62° 40′, in Sweden. Further eastward it sinks to a lower latitude; and in Central Asia it appears not to extend beyond lat. 55° or 57° north, forming a curve nearly coinciding with the isotherm of 41°. To the south of this, from lat. 54° to 40°, at the level of the sea, on the coasts and river-banks, it constitutes one of the most prevalent diseases. On the shores of the North Sea it causes a mortality of 1 in 20, and even 1 in 14. On the northern boundary it appears only in its more simple form during summer and autumn. Between lat. 55° and 40° it occurs usually in spring as tertian, and in autumn as quartan ague. It is prevalent on the Lido shores and in the Gulf of Venice, but does not enter the city. It is periodical at Rome. Elevation above the level of the sea has a very marked influence on the occurrence of intermittent fever; thus, while it ravages the *tierra caliente* of Mexico, near the level of the sea, it is almost unknown in and around the city of Mexico, 7,450 feet above that level, although both places are in the same latitude. The inhabitants of the Appalachian Mountains, at an elevation of about 3,000 feet, are almost exempt; while those who inhabit the valleys, under the same parallels, are affected. Farther north, at an elevation of 1,500 feet, at the sources of the Alleghany and Genesse rivers, the disease is almost unknown; while on the low shores of Lake Ontario, directly north, it is prevalent. In lat. 41° it is prevalent at 900 feet above the level of the sea. It also prevails at lat. 41°.30 north, at 1,100 feet in elevation, all along the rivers and ponds in the Cuyahoga Basin. The constantly increasing elevation of the desert to the west of the Mississippi, and the increasing dryness of the plains, are probably the chief causes of the disappearance of the fever, under the same parallels in which it prevails on the banks of that river. In Europe, in lat. 52° north, at Cassel, it rises little more than 400 feet above the sea. One degree farther south it occurs every year at an elevation of 600 or 700 feet, near Berka on the Werra; but at 900 feet it comes only once in ten years in isolated cases. In lat. 47°, at Grätz, 1,200 feet above the sea, it is endemic; it is sometimes epidemic at Stanz in Switzerland, 1,700 feet high; and it is prevalent on the plateau of Castile, 2,300 feet high. In Peru, ague is observed at an elevation of 10,000 or 12,000 feet above the sea, and according to Tschudi, it occurs there in dry and barren regions. In Iceland no native is attacked

by ague, and strangers suffering from it soon recover: it is unknown in Tasmania.

The geological formation which appears to be favourable for the development of the malady is indicated by Dr. Drake, who says of North America, "the whole southern portion of the cretaceous formation is infested with autumnal fever, beyond perhaps any other portion of the Great Valley"; and again, "like the cretaceous formation, the tertiary region is subject to autumnal fever of a violent character." It has been observed that this fever occurs everywhere in the same geological formation, and in its extension seeks a similar kind of soil. Bierbaum instances the provinces of Alentejo and Algrave in Portugal, where intermittents and remittents prevail, as being similar to South Carolina and some portions of the West Indies. Ague is common among the natives of the Netherlands; it is endemic from the Scheldt to the mouth of the Meuse. At Walcheren, in 1809, two-thirds of the British army were seized with ague, and more than 1,000 died of the disease within the last four weeks of their encampment there.

At Bordeaux, ague is endemic in spring and autumn. Here, when the pools at the west end were drained in 1805, an epidemic ague broke out and seized 12,000 men, of whom 3,000 died in five months.

The influence of sudden atmospheric changes in the production of this disease was exhibited at Landau, where Pauli observed, that on one occasion, when the barometer fell 18° in twenty-four hours, thirty-two individuals were seized with ague within five days.

The decrease of autumnal fevers with the decrease of temperature is strikingly exhibited in the tables furnished at twenty-six military posts between the Gulf of Mexico and Lake Superior. In latitude 24° 33′ north, at Key West, the total number of attacks was—intermittent fevers, 179; remittent, 11; total of the year, 190: while at Fort Brady, latitude 46° 39′ north, the number of cases of intermittent fever was 41, and of remittent 3; total, 44. At Havana it rages epidemically from April to December, and sporadically throughout the rest of the year. The space between latitude 33° and 34° north is traversed by the Cumberland Mountain, a part of the Appalachian chain, forming a rampart more than 1,000 feet in height. This constitutes a climatic limitation to plants, both indigenous and cultivated. In every fertile and well-peopled part of the country south of this rampart, the diseases have a more southern character than on the north, in which direction the tables referred to show a

decided and gradual decrease. At Toronto both intermittent and remittent fevers prevail every year, but they are more severe in some years than in others. Simple ague is most common, and intermittents are rare. At London and at Fort Malden, Canada West, autumnal fever still prevails. Intermittent fever is especially a disease of newly-peopled countries, and when it disappears it is because the topographical conditions on which it has depended have been removed. The influence of settlement, cultivation, and town building, is always found beneficial in banishing or mitigating autumnal fever. The prairies, being marshy, are liable to autumnal fever. Open prairie-lands are more healthy than the vicinity of woodlands, probably owing to the greater moisture of the latter. The breaking-up of prairie-land induces fever, but sometimes it does not appear till two and three years after the arrival of the first settlers.

3. *Cholera.* Diseases with choleraic symptoms are observed every year, and at all seasons, in the torrid zone, but most frequently and characteristically in the East Indies, where Asiatic cholera appears to be to the Ganges delta that which the yellow fever is to the delta of the Mississippi, or the plague to the delta of the Nile. Cholera, known from time immemorial, and described in Sanscrit works as an endemic climatic disease, limited to the place of its birth, the delta of the Ganges and the shores of India, was first observed as an epidemic in Bengal, in the month of May 1817; thence it spread first north-west to Mirzapore, next south and south-west, and then continuously in a direction contrary to the monsoons; afterwards it extended in all directions, so that within fifteen months it passed through the whole of India to Bombay. It was influenced in its attacks by the state of the weather, the position of a place, and the means of resistance. In summer it was always more severe than in winter, partly from the greater agglomeration of men in the former season. It was carried by vessels to the great seaports, to the Mauritius, Reunion (Bourbon), etc., where it raged among the ships' crews. At the same time it extended into the interior of the continents, step by step, following the movements of troops and the routes of caravans in all directions. Having gained the great trading cities and fortified towns, it started from them as fresh centres, till it overspread all Asia from Aleppo and Bagdad to Pekin. Thence it reached Ceylon, the Philippines, Moluccas, and Sunda Islands. In the East its victims were countless. At Muscat in Arabia, and its vicinity, for example, more than 125,000 persons perished.

The great movements of troops occasioned by the wars of the British with the Indian tribes,—of the latter with Persia, of Persia with Russia, and of Russia with Poland, brought the disease systematically into Europe; and it is calculated that in the Russo-Turkish campaign, cholera was, to both armies, ten times more destructive than the bayonet or the bullet. At the end of that war it was expected that the disease would be arrested by the removal of the troops from infected districts, and by the approach of winter, but it was found necessary to convey some Russian troops from Persia and Turkey to Poland, and thus cholera reached the banks of the Vistula. The Austrian and Prussian quarantine systems were useless, and so it spread from St. Petersburg to Odessa, by ships throughout Europe, the whole of which was visited by the epidemic, except such countries as Saxony, some of the regions of middle Germany, and others inclosed by mountains, or where little commercial intercourse is carried on. From Europe cholera speedily crossed the Atlantic with the great tide of emigration towards the United States; here it showed itself in its most virulent form, especially in the ports where emigrants landed, but at first it did not extend much into the interior. The first ships with cholera patients on board arrived at New York and Quebec in 1832. At New York a kind of quarantine was kept up, and many died in the hospitals. In Canada, as in Europe, none was attempted, and it spread through the larger towns, and along the commercial routes to the States of the Union. Chicago, on the south coast of Lake Michigan, the chief port for Canadian emigrants, was attacked first, and most severely. The next point whence it spread through the States was New Orleans, to which it was carried by ships from New York, shortly after its arrival there. At New Orleans from 80,000 to 100,000 emigrants arrive annually from Europe, and there is no quarantine. Food for the disease was supplied by the arrival almost daily of hundreds of new emigrants, of whom often thirty died in one vessel on the voyage from England, Germany, or France. It ravaged Lafayetteville, a suburb of New Orleans inhabited chiefly by Germans and Irish, and was carried quickly by steamers to Louisville and Cincinnati on the Ohio, both, but especially the latter, chief landing-places for emigrants. Here the mortality was frightful, greatly owing to a kind of fatalism, which led the Germans and Irish to believe that it was useless to attempt precaution or remedy, farther than by wearing amulets, and confining their diet to herrings and cold water. From Cincinnati the disease extended up the

Ohio to Pittsburg, and spread thence to New York, Philadelphia, and Baltimore, where, fortunately, it was arrested by the sea. At the same time it was carried by steamers to Albany on Hudson Bay, where it was very severe. From New York it spread little at first; and, while it extended from Europe to New Orleans, and thence to St. Louis, Louisville, Cincinnati, and New York, numerous cities which lie between, on the Mississippi and the Ohio, remained either altogether free, or were only overtaken long after the outbreak of the disease in places more than a thousand miles to the north and east of them. In the vicinities of great cities it often did not appear till after it had travelled to places many hundred miles distant. It passed from New Orleans to Texas before it showed itself in the vicinity of the city, and from St. Louis it was conveyed by travellers to California, among the Indians, to Independence and Fort Leavenworth on the Missouri, and thence west to Fort Laramie, near the Rocky Mountains, and all this in less time than it took to reach Belleville, within a short distance of St. Louis. The whole of the southern States of the Union, with the exception of some of the cities on the Ohio, the Cumberland and Red Rivers, or large ports, as Baltimore, almost entirely escaped the cholera. At the ports of Galveston and Lavaca in Texas, where troops arrived from New Orleans, it first appeared in 1848; hence it accompanied the gold-diggers into the interior, to Austin. Shortly after its appearance in Galveston, it was conveyed by ships from New Orleans to Corpus Christi and Brazos St. Jago, at the mouth of the Rio Grande, and accompanied the caravans and steamers along that river.

Matamoras was next visited, in summer; and thence, extending westward, the cholera attained the height of 5000 feet above the sea at Chihuahua, and a still greater elevation in the district of Paso del Norte on the Rio Grande. In the former city, from ignorance of its treatment, it carried off almost every one who was seized, amounting to 60, 70, and even 107 in one day. The States of Ohio, Illinois, and Missouri, suffered most of the whole Union; not only because the chief emigrant ports are situated in them, but because they are traversed by the principal navigable rivers. The most fatal places were in Ohio, the district between Sandusky and Cincinnati; in Illinois, the vicinity of Belleville, the towns on the Mississippi, on the Illinois, the canals, and Lake Michigan; and in Missouri, St. Louis and its vicinity, the principal towns on the Missouri, and the routes leading to California. The frequent appearance of cholera along the

courses of rivers led at first to the hypothesis, that the disease had a peculiar affinity for water; but the fact was overlooked, that great cities, necessarily the centre of epidemic virulence, are mostly situated on navigable streams; and the triumphant march of the cholera-plague along the caravan routes in Asia and America, where no water was met with for many days in succession, evinced the fallacy of the opinion. This great epidemic spanned the entire globe: unlike the yellow fever, it was not confined to a certain elevation above the earth's surface, but, leaving the lower stratum of the atmosphere, it followed its victims to the summits of great elevations, as in the table-land of Malwa, the villages of which are situated 2500 feet above the level of the sea. In 1818 it appeared at Catmandoo in Nepaul, at the foot of the Himalayas, nearly 5000 feet above the sea; and in 1822, and again in 1852, it raged with great violence at Erzeroum, 6100 feet above the sea. Yet it appears that difference of level has a certain influence on the frequency and virulence of the disease. In the higher quarters of Paris, with an elevation of 56 feet above the river, the deaths were at the rate of 18·55 per 1000, while in the lower quarters, 9 or 10 feet above the Seine, the deaths were 23·60 per 1000. In London, the deaths were nearly in the inverse ratio of the elevation of the ground: under 20 feet above the Thames the proportion was 102 in 10,000; from 20 to 40 feet, 65 in 10,000; from 40 to 60 feet, 34 in 10,000; and from 60 to 80 feet the mortality was 27 in 10,000; 80 to 100 feet, 22 in 10,000; at 350 feet, only 8 in 10,000. In a single year England lost, by the visitation of cholera, 70,000 individuals, of whom 30,000 were adults, being 10,000 more men than fell in battle in the wars between 1800 and 1815.

4. The *Plague* has its endemic seat on the eastern shores of the Mediterranean, where it has been known to exist since the middle of the sixth century. Pariset considers the Nile delta as the peculiar developing place of the plague. The causes to which it is attributed are, the great heat, the overflowing of the river, the want of cleanliness in the people, and the exposure of the dead in and near their dwellings. It may be considered as occupying permanently a portion of the Old World, extending between the parallels of latitude 29° and 42° north; and while it is thus permanent in some places, it appears more or less frequently in others. Its term of periodicity was reckoned to be, for Constantinople 9 years, Egypt 5, Aleppo 10, Antioch 15, and Cadiz 43 years. In Sydenham's time it was said to ravage England every

40 years. It has not appeared in Scotland since the reign of Charles II, although it remained a few years longer in England. It seldom extends to the southward beyond Siout in the valley of the Nile, or Jiddah on the Red Sea. In Asia it prevails chiefly on the coasts of Syria, and a portion of the shores of Asia Minor, where it sometimes ascends the river valleys. In Europe it is endemic only on a part of the eastern coast of Turkey. In 1816 it was very destructive in the Ottoman empire, and extended into Austria, Italy, and Sardinia, and it was at Moscow and Marseilles last century. In 1841 it raged in Syria and at Erzeroum with great violence. It has never yet appeared in the southern hemisphere, nor in America.

Like the yellow fever, the plague appears to be limited to the lower portions of the earth's surface, the more elevated situations being usually exempt from its scourge. When it is ravaging the lower quarters of Constantinople, the inhabitants of the higher portions of the seven hills on which the city is built often escape altogether; and Brayer mentions a village situated on mount Alem Dagh, at an elevation of about 1600 feet above the sea, where it was never known to appear, and which was resorted to as a place of refuge for the citizens; and there is a place in Malta hitherto inaccessible to the disease, and on this account called *Safi* (pure). It is recorded by the French physicians, that during their occupation of Cairo, the plague never reached the citadel of that city; and Clot Bey states that it, as well as the village of Loumeldik, situated at a considerable elevation, was spared during the epidemic of 1835. The nature of the soil has much to do with the development of this disease. As an argillaceous soil is most favourable for the development of malarial fevers, so it is a characteristic of the localities where the plague is endemic. Pugnet says that it rarely appears in deserts or sandy soils, but that it immediately breaks out on the rupture of the dyke which confines Lake Madieh; and Clot Bey observes that, during the great epidemic plague of 1835, the Egyptian regiments encamped in the desert escaped almost entirely, notwithstanding the maintenance of communication with the capital and other places where it committed the greatest ravages. Ghizeh, which is placed on the banks of the Nile, and completely inundated by the river, is much more frequently infected than Cairo. Salahieh does not receive its contribution of Nile water till long after the capital, and it is not visited by the plague till after a similar interval. According to Gaetani Bey, the plague is arrested

f 2

at Assouan, on the borders of Nubia, on account of the difference of situation, heat, dryness, and the nature of the soil. It breaks out readily in localities where the water is stagnant from the absence or neglect of canals; hence Bassorah and Bagdad, formerly safe through the cautious administration of the canals, are now the theatre of this scourge.

When the plague visits Constantinople, it appears usually between the 1st and 20th of July, and decreases on the approach of winter; while in Egypt it commences in winter, and disappears at the end of June.

5. *Typhus.* This form of fever, which occurs frequently as an epidemic, appears to belong exclusively to the north temperate zone, and even here it avoids extreme latitudes. It is scarcely ever mentioned by medical voyagers in hot countries. As yellow and intermittent fevers occur in low latitudes, near the level of the sea, so typhoid fevers have their base line in a high latitude, and at a greater elevation. Yellow and intermittent fevers decrease from south to north, but typhus, on the contrary, decreases from north to south. In America, typhoid fevers diminish in frequency beyond the parallel of 45° north. Typhus does not appear among the fur stations of the Hudson Bay Company between the parallels of 48° and 58° north; and no mention is made of its occurrence among the crews of the Arctic voyagers nor among the Esquimaux, who live in close unventilated snow huts; neither has it been observed by Ermann and Wrangell among the inhabitants of Siberia. Typhus has, therefore, a northern as well as a southern limit. In Western Europe it prevails between the parallels of 44° and 60° north, or between the isothermal curves of 48° and 52°; and in North America between the parallels of 32° and 48°. In places where the mean annual temperature rises above 62°, or falls below 40°, it prevails but little in either continent. The geographical and climatal limits of typhus in Europe and America will be found to correspond nearly with those of the glutinous cerealia and the potato. It decreases with elevation; and to this cause has been attributed its absence in the hospital of Madrid, 1995 feet above the sea. It occurs in every season, but is most prevalent in autumn and winter. According to the army reports, typhus appears to be three times more prevalent in Lower than in Upper Canada. As intermittent fever is a disease of new, so typhus is of old countries; where the soil has been longest cultivated, typhoid fevers are most prevalent. The early settlement of the lands along the estuary of the St. Lawrence is probably the chief

cause of the remarkable prevalence of typhus, and the absence of intermittent fevers there.

During 1847, the so-called famine-typhus prevailed over a great portion of Europe. In Poland, especially in Galicia, and in Silesia, it was currently reported that 40,000 of the people were in a state of starvation. In Ireland it carried off 100,000 of the population. It commenced in Cork and Liverpool, where thousands of emigrants were assembled on their way to America. The wellbeing of the great trading towns prevented the spread of the disease on shore; but the good effects of sufficient food on ship-board were counteracted by the foul air of the crowded space between decks, and a fatal and highly contagious form of typhus was engendered among the passengers, which, in spite of quarantine regulations, they conveyed into the principal ports of Canada and the United States, whence it spread to the interior of the country. In Quebec, Montreal, New York, and New Orleans, not only the emigrants, but also the inhabitants, fell in thousands before the scourge. In New Orleans the "ship's fever," as it was called, was more dreaded than the yellow fever. The approach of winter, and a strict enforcement of quarantine laws, put a period to the epidemic in 1848.

6. *Phthisis.* Tubercular consumption cannot be said to be a disease peculiar to any one portion of the globe, or to be dependent on climate in any appreciable degree, unless it can be shown that it does not prevail in the excessive climates of the north. It originates in all latitudes from the equator, where the mean temperature is 80°, with slight variations, to the higher portion of the temperate zone, where the mean temperature is 40°, with sudden and violent changes. The opinion long entertained, that it is peculiar to cold and humid climates, is founded in error. Far from this being the case, the tables of mortality of the army and navy of this and other countries, as well as those of the civil population, warrant the conclusion that consumption is more prevalent in tropical than in temperate countries. Consumption is rare in the Arctic regions, in Siberia, Iceland, the Faroe islands, the Orkneys, Shetlands, and Hebrides. And in confirmation of the opinion that it decreases with the decrease of temperature, Fuchs shows, from extensive data, that in northern Europe it is most prevalent at the level of the sea, and that it decreases with increase of elevation to a certain point. At Marseilles, on the seaboard, the mortality from this cause is 25 per cent.; at Oldenburg, 80 feet above

the sea, it is 30 per cent.; at Hamburg, 48 feet above the sea, it is 23 per cent.; while at Eschwege, 496 feet above the sea, it is only 12; and at Brotterode, 1800 feet above the sea, 0·9 per cent. It is calculated that in the temperate zone, within which nearly all the civilised inhabitants of the globe are located, at least one-tenth of the population die of this malady. It is uniformly more fatal in cities than in the country: in England the excess in cities is equal to 25 per cent. The greatest mortality occurs from the age of 15 to 30: taking the sexes together, it destroys one-half of all who die from every kind of disease in Massachusetts, between these ages.

7. *Cretinism.* Wherever cretinism occurs, goître is generally present; but in many places where goître prevails, not one cretin is to be found. Although only recently brought into notice, cretinism was known and described early in the seventeenth century. Though sometimes sporadic, it is chiefly an endemic disease, supposed to originate in certain conditions of soil, air, and water, and occurring in deep narrow valleys of Alpine regions, as well as in low, flat, marshy districts: in the former it is termed *Cretinismus alpinus,* and in the latter, *Cretinismus campestris.* This dreadful malady, which has been termed the "Leprosy of the age," is thus defined by the Sardinian commissioners:—"Cretinism is a degeneration of the human species, which manifests itself in certain parts of the globe, and is characterised by a greater or less degree of idiocy, associated with a vitiated state of the body." They divide the sufferers into the complete cretins, simply vegetating masses, devoid even of instinct; the half cretins, who can articulate some words, can make themselves understood by gesticulations, and can perform some mechanical labour; and the cretinous, who are possessed of understanding and will. Cretinism differs from simple idiocy in that the body of an idiot is often well formed, while the cretin is an idiot whose physical formation has suffered a general degradation. In the complete idiot the faculties are radically extinct, or exist only in a rudimentary state, whilst in the cretin they are oppressed and overpowered by the disease, but not abolished. The cause of this disease has been sought for in all the natural elements, by turns, without any satisfactory result. In the province of Kumaon in India, goître is so prevalent that one-half of the population is afflicted by it. A large proportion of these cases occur among the population who live on the limestone formation; whilst goître is almost unknown on the granite, gneiss,

and sandstone formations. One in every three of the population on the limestone formation was afflicted with goître, and one in twelve was a cretin. On the mica, hornblende, and sandstone formations, neither goître nor cretinism was seen. Hence the disease is produced, according to some authors, by the use of water impregnated with lime. Others refer it to exhalations from the soil, electricity, drought, etc. Again, a specific malaria is contended for as the only way to account for the appearance of the malady in one part of a valley, a village, or even a single house, while in the immediate vicinity it has never appeared. In Europe, cretinism occurs in the valleys of the Pyrenees, the Alps, Apennines, the Schwarzwald, the Rauhe Alp, Thuringer Wald, the Harz, the Erz, and the Riesen-gebirge, in the Carpathians (Neusohl in Hungary), among the mountains of Styria, the Vosges Mountains in France, in the West of England, in Wales, in Denmark, and the lowlands of Rhenish Prussia: and it has recently been observed in Berlin, Paris, Vienna, and other populous places. It prevails in the mountainous countries of Upper Asia, in the Cordilleras of South America, and in the northern part of North America.

Saussure was the first to remark that cretinism is limited to a certain height above the sea. This he fixed at 1,000 metres (3,280 feet) in Switzerland; and numerous observations have since confirmed the general accuracy of his statement, which is exemplified in the total absence of cretins at Ursern, in the Canton Uri, 4,600 feet above the sea, where, in 1847, not one was found in a population of 4,000. In ascending the St. Bernard from Martigny, the disease decreases in proportion as the surface rises, till, at the highest village, St. Pierre, no trace of it is to be found. The Sardinian Commission dispute this statement, and account for the number of cases occurring under 3,200 feet, by the circumstances that the cultivated soil and the habitations of men are found under this level; and they quote many villages in Savoy much higher than this, which are peopled with cretins. But all observation shows that this limit changes as in the case of other diseases, according to geographical position. Thus in Southern Germany it varies from 1,400 to 2,100 feet; in Würtemberg it is about 2,100 feet; in Sardinia, 5,300 to 6,400 feet; and in the Cordilleras of the Andes, according to Humboldt and Boussingault, 15,000 feet. Exceptional cases occur in Switzerland above the height named, and the Sardinian Commissioners themselves state that the most elevated parts of Upper Savoy are

entirely exempt from goître and cretinism. It is calculated that in Switzerland there are in all 20,000 cretins, and these are very unequally distributed; for while in the Canton Valais there is one cretin in every 25 of the inhabitants, in that of Uri there is 1 in every 83, and in the Canton Glarus only 1 in 375. In 1845 the population of Sardinia was 4,125,740, half of whom occupy the mountainous districts where cretinism is endemic. The number of cretins is stated by the commission at 7,084, of whom 5,500 were in the provinces of Savoy and Aosta, 1,413 in Maurienne, and 2,180 in the valley of Aosta.

From the inquiry instituted by the king of Würtemberg, conducted by Dr. Rösch, it appears that in a population of 1,726,536 souls, 5000 families were more or less affected by the disease, of whom 1000 were cretinous-deaf, and 144 cretins of the highest degree, destitute even of the appearance of humanity. Baden had, in 1844, 440 cretins, of whom 275 were complete, and 165 half cretins; in 1847 the total number had increased to 490. The official returns of the population of France for 1851 show that 42,382 of the inhabitants were goîtrous (not distinguishing cretins), equal to 118 in 100,000 individuals; these were mostly in the departments Hautes Pyrenées, Hautes Alpes, Ariége, Vosges, and Puy de Dôme.

The government of Bavaria instituted an inquiry in 1840; and Professor Virchow reports, that in Lower Franconia alone, in 500,000 of a population, there are at least 200 true cretins. It appears that the disease is most prevalent in the highlands of Bavaria, but statistics are not yet published on the subject. In Upper Austria the disease is so prevalent along the banks of the Danube, that, according to Dr. Schauzberger, whole families consist entirely of cretins and half-cretins; so that, in villages with a population of 4000 to 5000 souls, not one man is found capable of bearing arms. And the statistical inquiries instituted by the Archduke John show, that in Styria there are 6000 cretins of the highest grade. In Rhenish Prussia, cretinism is endemic in the lower districts. Of this the small island of Niederwörth, below Coblenz, furnishes a remarkable example. Of 750 inhabitants, nearly all are goîtrous, and 40 are cretins. The other places where it is most prevalent are the vicinity of the Lacher-see, near Bonn, and the village of Niedermendig, celebrated for its millstones, where there are 22 cretins in a population of 300. In Denmark, Dr. Huberts states, that among 2000 idiots there are many true cretins. These are

found mostly on the north sides of the valleys, as in the Canton Argovia, in Switzerland. In England, cretinism is endemic in Somersetshire, where the village of Chiseleborough, situated in a valley, has 350 inhabitants, the greater part of whom are goîtrous, and 24 are cretins. A village in Yorkshire, with 200 inhabitants, has 20 cretins. The Netherlands are remarkably exempt from this form of disease.

8. *Goître* occurs in all quarters of the globe. In Europe it is prevalent in the valleys of the Pyrenees, on the Spanish more frequently than on the French side, where the mountains are more steep; but the plains of Spain, as well as the highest inhabited parts, are free from the disease. It is endemic in all the mountainous countries of middle Europe, from the French coast to the shores of the Black Sea. It also appears sporadically in the plains of middle Europe, at Berlin, St. Petersburg, and in other parts of Russia; but the marshy districts of Russia on the North Sea are exempt from goître. In England it is common in Warwickshire, Lancashire, Somerset, and Derby; in the latter county it is so prevalent that it is termed the "Derby neck." It is said to occur in Scotland, in the island of Arran and in Peeblesshire.

Its northern limit is in Western Norrland, Sweden, about latitude 63° north. In Asia it occurs in the mountain valleys of the Ural, the Caucasus, the mountains of Lake Baikal in Central Asia, in the Himalayas, and in Sumatra. In Africa goître has been observed in the Atlas Mountains, and in the mountains of Kong. In North America it is very prevalent: its northern limits appear to be about latitude 58° north, at the sources of the Peace River. It is common on the banks of the Saskatchewan River, in Upper and Lower Canada, in the States of New York and Pennsylvania, and especially on the tributaries of the Ohio, where the Indian women are generally goîtrous. In South America it extends to latitude 44° south, in the valleys of the Cordilleras, and also in Brazil. In its prevalence above the level of the sea it closely resembles the distribution of cretinism.

9. *Leprosy*. In its endemic distribution, this malady extends over South America to latitude 30°, excluding, therefore, the southern portion. In North America it occurs in Greenland; and in Europe it is limited to portions of Greece, Norway, Iceland, and Lapland. In Africa it spreads to latitude 20° south; it was frequently observed in the upper Niger; and it prevails over the western and south-eastern parts of Asia, with the adjacent islands. Its greatest intensity corresponds with the belt of maximum heat of the globe.

According to Pliny, *lepra nodosa* appeared in Italy and other parts of Europe in the second half of the second century B.C. In consequence of the warlike expeditions of the Saracens and the Crusaders, it became so general, that at the end of the thirteenth century, 19,000 hospitals for lepers were opened in Middle and Western Europe. Here it remained till the fifteenth century, when it invaded Russia, and extended to Iceland and Greenland. Leprosy had, therefore, left its original endemic centre, and spread in a direction from south to north. Afterwards it gradually declined, and is now of comparatively rare occurrence in Europe and North America. The malady is however common at Bahia in Brazil. It is probable that the disease in the Western Hemisphere is the same as that of the East, or a similar malady modified by climate.

10. *Pellagra, Italian Leprosy, or the Lombardo-Venetian Plague,* is a disease which has baffled all attempts to discover its origin. Its usual course is lunacy, mania, or helpless imbecility, and death. In 1831 official returns showed that 20,000 Milanese—amounting to one-third or one-fourth of all the patients in the Lombardo-Venetian lunatic asylums—were attacked by pellagra; and in 1843 the proportion in the hospitals of Brescia had increased to three-fourths of the patients. This loathsome malady is described as being much more deplorable even than cretinism: it sometimes keeps the patient in a hopeless state for ten or fifteen years. It has been ascribed to the use of maize, which forms the principal article of diet to nine-tenths of the Milanese peasantry; but it does not occur in the similar maize-growing districts of Naples, Sardinia, and Sicily, nor even in some districts of Lombardy itself. It appears to be a local disease, and is cured by removal and nourishing animal diet. Some years since the pellagra appeared in France, in the department Gironde, and in Gascony. Its limits of greatest intensity are between latitude 43° and 46° in Upper Italy, the south of France, and the north of Spain.

THE ARMY.

Since a great part of our information regarding diseases incidental to tropical countries is derived from tables of the sickness and mortality of European soldiers and sailors, it becomes important to inquire how far the morbid phenomena therein exhibited may be due to other causes than the direct effects of climate. It has been usual to attribute a large proportion of the mortality among troops to the use or

abuse of intoxicating beverages. Thus Forey says, in reference to the troops in America—"The vice of intemperance is the most prolific source of disease and death;" and again, "nine-tenths of the mortality at the salubrious posts along the coast of New England has its origin in inebriating potations." Similar statements constantly occur in the returns of the British army; and hence it is inferred that all stimulating beverages are hurtful in warm climates; but these statements, so injurions to the reputation of the soldier, are, it is believed, greatly exaggerated.

The deficiency of nutritious food is a frequent cause of mortality among troops. The use of invigorating nourishment is a primary condition of successful defence against malarial poison. Next to food, and perhaps before it, in importance in the development of disease, is the water, often stagnant or corrupted by exposure to the sun, or containing a large amount of salts, with which the soldier is obliged to satisfy his thirst. Besides physical causes, the soldier is subjected to moral influences, such as expatriation, chagrin, and many others, single or combined, which originate or increase derangement of the functions. To these may be added the unhealthy situation, overcrowding, and bad arrangements of the barrack accommodation in tropical countries, and the fatigue and exposure incident to the events of war, of which the returns of the British, French, American, and Prussian armies afford many instances. During the first occupation of Oran, in Algeria, the French army lost 1 soldier in 12, and 1 officer in 54, and this rate continued for several years; but in 1837 harassing expeditions commenced, and the rate of mortality from disease increased to 1 private in 9, and 1 officer in 42. When all was again tranquil, the mortality was reduced to 1 private in 19, and 1 officer in 90.

These circumstances, in great part peculiar to the army, render a comparison between the diseases incident to them and civilians in the same climates impracticable; and even a comparison of the liability to disease among soldiers of different armies is extremely difficult, since not only the difference of age at entry, and the longer or shorter period of service, but also the nationality of the soldiers, must be taken into the account.

On the other hand, many circumstances in an army favour this comparison, as the exclusion of the weak and sickly from all the returns, the same occupations, and a similarity in lodging, dress, and food—circumstances which no civil population can present on so large a scale. In the British possessions, France, and America, it is found that the mortality

among troops, even when in their own country, greatly exceeds that of the civil population; and that in the infantry the mortality is much greater than in the cavalry and artillery. According to Casper, the soldier and civilian in Prussia stand in precisely the same relation as regards mortality. He states from official statistics, that the mortality in the Prussian army averages only 13 per 1000. In Great Britain, the ratio is upwards of 15 per 1000; and Count Morozzo shows that among the infantry of the Sardinian army it amounts to 35 per 1000.

In the Prussian army, while the infantry, as stated, die at the rate of 13 per 1000, among the artillery the ratio is 10, cavalry 9, and the pioneers only 6 per 1000. This proportion holds in the British and French armies. Among the Sardinian troops it is still more striking; for, while in the infantry it amounts to 35 per 1000, in the cavalry it is only 18 per 1000. This appears to indicate that the infantry fall faster, because they have to bear the burden of the service alone, while the cavalry and artillery share it with their horses. The influence of climate on the health of troops is shown in the following table. The effects of discipline, or of undetected moral causes, are strikingly exhibited in the comparative number of suicides among the different corps. In Britain, of 10,000 men, 8 die annually by their own hands; in Prussia, only 4 in 10,000. In Britain, the greatest number of suicides occur among the cavalry; and this is also the case in Prussia, where among the artillery and pioneers the proportion is 2, the infantry 4, and the cavalry 7 in 10,000.

Comparative Statements of the Mortality among the British Troops serving in different parts of the Empire.

AVERAGE MORTALITY PER THOUSAND OF WHITE TROOPS ANNUALLY.

COLONIES.	For 20 years ending in 1836.	For 10 years ending in 1846.
New South Wales	14	11
Windward and Leeward Islands	78·5	68·7
Jamaica	121·3	66·9
Gibraltar	21·4	10·9
Malta	16·3	14·9
Ionian Islands	25·2	15·5
Bermudas	28·8	29·2
Nova Scotia and New Brunswick	14·7	13
Canada	16·1	12·6
Newfoundland	14	9·1
St. Helena	34·2	15·4
Cape of Good Hope	13·7	13
Mauritius	27·4	24·4
Ceylon	69.8	41·4

This Table shows a great saving of life during the last ten years.

In the year 1849, the ratio of mortality among the white troops, in our different colonies, was as follows, showing, in many instances, a great discrepancy with the ten years average above:—

In Australia, 8; British Guiana, 14·2; Trinidad, 33; Tobago, 98·6; Grenada, 12·3; St. Vincent's, 6; Barbadoes, 128·8; St. Lucia, 17·4; Dominica, 40·4; Antigue, 10·9; St. Kitt's, 19·4; Windward and Leeward combined, 68·4; Jamaica, 48·3; Gibraltar, 8·4; Malta, 30·1; Ionian Islands, 23·1; Bermuda, 8·4; Newfoundland, 10·3; Nova Scotia and New Brunswick, 19·7; Canada, 15·6; St. Helena, 8·4; Cape of Good Hope, 13·3; the Mauritius, 14·6; Ceylon, 21·5; Madras, 22·4; Bengal, 61·3; Bombay, 26·6.

Comparing the foregoing mortality with that of the troops in the United Kingdom, the superiority of the Australian climate will be manifest.

AVERAGE MORTALITY PER THOUSAND OF TROOPS EMPLOYED.

UNITED KINGDOM.	For 7 years previous to 1836.	For 10 years ending in 1846
Household Cavalry	14·5	11·1
Dragoon Guards and Dragoons	14·3	13·7
Foot Guards	21·6	20·4
Regiments of the Line	18·5	17·9

Among the French troops in Algeria, from 1837 to 1846, the loss was, in proportion to those serving in France, as 77·8 to 19·5, or nearly as 4 to 1. Since the illusion of the supposed power of acclimatisation to abate disease in hot climates has been detected, and the system of rotation, limiting the residence of a body of troops to three years in the same colonial region, has been adopted, a great decrease of mortality has resulted at all the stations. In Gibraltar this decrease was from 22 per 1000 before, to 12 per 1000 after the change of system. For several years the mortality among medical men on the west coast of Africa was 78 per cent. annually, and no one could be got to supply the vacancies; but when the time of residence was limited to one year, the mortality immediately fell to 25 per cent.

It is a common prejudice, even in the army, that the number killed in battle exceeds the mortality from disease; but this is so far from being the case, that the loss of the French army in Egypt, at the beginning of the present century, was, killed in battle, 3614; mortally wounded, 854; killed by various accidents, 290; died by disease, 4157; total, 8915.

The British army in Spain lost in 41 months—January 1811 to May 1814—on a force of 61,511 men, 24,930 by

disease, and only 8,889 by the fire of the enemy. The same rule holds good in the navy.

THE NAVY.

The *Home station* of the British navy embraces the flag-ships, revenue-cutters, etc., on the shores and in the harbours of Great Britain and Ireland. The *Mediterranean command* comprises the whole of the Mediterranean Sea, from the Strait of Gibraltar to the Gulf of Scanderoon, and the shores of Spain and Portugal north to Lisbon. The *Cape of Good Hope command* includes the east and west coasts of Africa; and the *East India command* extends from the Isthmus of Suez to Tasmania; but the operations of the squadron are principally directed to the Bay of Bengal, the coast of Coromandel, and the island of Ceylon. The *North American* and *West Indian command* extends from the southermost shores of the Spanish Main to Labrador, including the Windward and Leeward Islands and the whole coast of the Spanish Main. The *South American command* comprises the east and west coast of South America, and the western shores of North America, with an occasional extension to the Sandwich, Marquesas, Society, and Friendly Islands.

The diseases incident to sailors are the same as those which prevail in the countries off which they are cruising. Thus, on the North American and West Indian station, and in the West African command, the rate of mortality from fevers and dysentery is comparatively high; while off the south-east coast of Africa, the whole of South America south of the equator, and the northern shores of North America, which are all very healthy, it is remarkably low. The comparative amount of sickness and mortality from consumption is shown in the following table, which gives the average for seven years, from 1829 to 1836:—

STATION.	Number attacked per 1000 of force	Died per 1000 of force.
East Indies	2·9	1·2
Home	4·1	1·4
South America	3·2	1·5
Africa	3·4	1·5
North America and West Indies .	4·8	1·9
Mediterranean	5·1	1·9

From this it appears that the mortality from this disease was least in the East Indian, and greatest in the West Indian and North American force; but the loss in the greatest, being under 2 per 1000 annually of those employed, is not heavy when compared with that of other portions of society at corresponding ages. Although the proportion of mortality in

the West Indian and North American and the Mediterranean commands was the same, the proportion of attacks in the latter preponderated. From the returns it appears, that the Mediterranean station of cruising-ground is the least favourable of any to consumptive disease; for, besides the greater frequency, there was also a larger proportion of invaliding. The East India station was most favourable for diseases of the lungs, but least so for dysentery. On the Home station the deaths from this cause amounted to only 3 in 56 attacks; in the East Indies the ratio 4·2 per 1000 annually; in the African, 3·4; in the South American, 1 per 1000 annually of force; and in the West Indian and North American commands, and the Mediterranean, it was 1 in 3500 each.

Nothing can be more striking or satisfactory than the results of sanitary measures in the British navy. Formerly scurvy, putrid fevers, and ulcers, were considered inseparable from a life at sea. In 1741, the *Centurion* ship of war lost 200 men out of 400 from scurvy, on the South American station, which is now as healthy as the Home station. In 1797 the victualling of the navy was changed. Abundance of wholesome food and good water was supplied, and immediately the health of seamen strikingly improved, and this improvement has been regularly progressive. In 1779, one out of every eight seamen employed in the navy died; in 1811, one out of 32; in 1836, one out of every 72. Or in other words, 76 years ago the mortality was at the rate of 125 per 1000 annually of the force employed; 50 years ago, 31; 15 years ago, 13 per 1000; and now (1856) the lifetime of sailors is not only far beyond that of soldiers, but the chances of longevity, in a well regulated life at sea, are at least equal to those in the most favoured regions ashore. Between the years 1780 and 1783 the comparative mortality in the British navy was, from disease, 3200 men; died in battle, 640; died by wounds, 500. During the three years of active hostility on the coasts of China, 1840-1843, only 29 men fell by the hand of the enemy, while 748 perished from other causes, chiefly diseases produced by climate.

[From anxiety to print the whole of Mr. Johnston's learned paper in one fasciculus of the *Transactions* of the Epidemiological Society, the Annual Report of Council, and the Report of the Epizootic Committee on Pleuropneumonia, are necessarily postponed. Mr. Johnston's paper has been written for publication in his valuable *Physical Atlas*, where it is accompanied by a map, in which the facts laid down are carefully delineated. It is no false praise to say, that no scholar out of the domain of medicine has ever before contributed so valuable a document to medical literature. The members of the Epidemiological Society feel that Mr. Johnston's contribution to their *Transactions* of a paper so rich in research, and intended exclusively for his own masterly work, is an act as graceful as it is generous.]

QUARTERLY REPORT OF PROCEEDINGS.

PAPERS READ AT THE ORDINARY MEETINGS.

Monday, April 7th, 1856.—"On Concurrent Scarlet Fever and Measles." By W. B. Kesteven, Esq.

The Report of the Epizootic Committee of the Epidemiological Society on Pleuropneumonia among Cattle.

Monday, May 5th.—"On the Geographical Distribution of Health and Disease in Connexion chiefly with Natural Phenomena." By Alexander Keith Johnston, Esq., F.R.S.E.

Monday, June 2nd.—"Suggestions for Observations on the Natural Influence of Cholera in the Lower Animals." By Walter Lauder Lindsay, M.D., Perth.

PRESENTATIONS.

Besides several works on epidemic diseases, the Society has received a valuable Map illustrating the Geographical Distribution of Health and Disease, from A. Keith Johnston, Esq., F.R.S.E.; and a Chart of the great Epidemics which have passed over Europe between the years A.M. 1348 and A.D. 1850, from Dr. Henry Kennedy of Dublin.

NEW OFFICERS OF THE SOCIETY.

At the Annual Meeting in April, the following gentlemen were elected office-bearers for the session 1856-57:

President.—Benjamin Guy Babington, M.D. F.R.S. *Vice-Presidents.*—Thomas Addison, M.D.; Richard Bright, M.D., F.R.S.; Sir B. C. Brodie, Bart., F.R.S.; Sir Wm. Burnett, K.C.B., K.C.H., F.R.S.; Sir C. M. Clarke, Bart., M.D., F.R.S.; Rev. Thomas Dale, M.A.; R. D. Grainger, Esq., F.R.S.; Sir Charles Hastings, M.D., D.C.L.; Sir John Liddell, C.B., M.D., F.R.S.; John Nussey, Esq.; John Propert, Esq.; John Simon, Esq., F.R.S.; Andrew Smith, M.D.; Thomas Southwood Smith, M.D.; Colonel Sykes, V.P.R.S.; Thomas Watson, M.D. *Treasurer.*—Thomas Addison, M.D. *Honorary Secretaries.*—J. O. McWilliam, M.D., F.R.S., R.N.; J. H. Tucker, Esq. *Foreign and Colonial Secretaries.*—Belgium—A. Sayer, M.D.; East Indies—James Bird, M.D., C. Finch, M.D.; Egypt and Syria—William Camps, M.D.; France—Waller Lewis, M.B., F.G.S.; Germany and Russia—Hermann Weber, M.D., W. E. Swaine, M.D.; Portugal and the Brazils—J. O. McWilliam, M.D., R.N., F.R.S.; Sweden, Norway, Denmark, and Iceland—R. Gordon Latham, M.D., F.R.S.; West Indies and North America—G. Milroy, M.D. *Other Members of Council*—C. L. Bradley, Esq.; A. Bryson, M.D, F.R.S., R.N.; Burford Carlill, M.D.; W. D. Chowne, M.D.; Robert Cross, M.D.; Geo. Glover, Esq.; Headlam Greenhow, M.D.; E. Headland, Esq.; T. Hunt, Esq.; C. F. J. Lord, Esq.; J. F. Marson, Esq.; W. E. Murphy, M.D.; B. W. Richardson, M.D.; E. C. Seaton, M.D.; F. Sibson, M.D., F.R.S.; J. Snow, M.D.; F. O. Ward, Esq.; J. Waters, M.D.

ERRATA.

At page 11 in the *Transactions of the Epidemiological Society* for April 1856, line 33, for June 29, 1853, read 1855; at page 16, line 32, for 1845 read 1855; and at page 19, line 4, for 1853 read 1855.

TRANSACTIONS

OF THE

EPIDEMIOLOGICAL SOCIETY OF LONDON.

ANNUAL REPORT OF THE COUNCIL.

(*Presented to the Society, April* 7, 1856.)

MEMBERS OF THE SOCIETY.

DURING the last twelve months nine resident members, eleven non-resident members, and eight corresponding members have been added to the Society; three resident members have withdrawn, and the Society has suffered by death the loss of a Vice-President (Dr. Hough), and of four other members, of whom three (Dr. Gavin, Mr. Pilcher, and Mr. Walsh) were members of Council.

The following is the present number of resident, non-resident, corresponding, and honorary members:—resident members, ninety-seven; non-resident members, thirty-nine; corresponding members, eighty-five; honorary members, six.

PROGRESS OF THE SOCIETY.

It was intimated to the Society, at the last Annual Meeting, that the Council had resolved to appoint a Sub-Committee to draw up a brief statement of the objects, proceedings, and results of the Society, for the purpose of distribution among the profession, and general public, and thus making the Society more generally known. This Sub-Committee shortly afterwards presented to the Council a plain and clear summary of the objects for which the Society was instituted, the progress it had made, and its claims to public support.

Nearly three thousand copies of this summary have been circulated among the general and professional public; and

through the kind liberality of Dr. Richardson, it has had the benefit of extensive publicity in the columns of his *Journal of Public Health.*

A circular letter, enclosing a copy of the summary, is now also being forwarded to every new Medical Officer of Health appointed under Sir B. Hall's Act; and the Council earnestly hope that many of those gentlemen may be induced to join the Society, where the results of their labours and experience can be brought forward and discussed at the ordinary meetings, with mutual benefit to the Society and to themselves.

PAPERS READ AT ORDINARY MEETINGS.

The Papers read during the year at the Ordinary Meetings have been of more than ordinary interest.

Monday, April 2nd, 1855. A Paper "On Typhoid Fever as it appeared in the towns of Chatham and Rochester in 1854", by Frederick James Brown, M.D., of Chatham, was read by Dr. McWilliam. On the same evening, a Paper "On the occurrence of Fever at Sible Hedingham, Essex, and at Cowbridge, Glamorganshire", by W. Camps, M.D., was read by the author.

Monday, May 7th. A Paper entitled "Some Remarks on the Bowel Disease prevalent in the Crimean Expedition during the Winter of 1854-5", by William Smart, M.D., Surgeon of H.M.S. *Diamond,* stationed at Balaclava, was read by Dr. McWilliam.

Monday, June 4th. A Paper "On the Propagation of Cholera through the Medium of Water", by John Snow, M.D., was read by the author.

Monday, July 2nd. "An Account of the Epidemic of Small-Pox in Jamaica in 1832", by Dr. Bowersbank, of Spanish Town, Jamaica; with "Observations on the Protective Value of Vaccination in Hot Climates", by E. C. Seaton, M.D., was read by Dr. Seaton.

Monday, August 16th. Communications "On Cholera", by Dr. Varrentrapp, of Frankfort-on-the-Maine; and "On the Premonitory Diarrhœa of Cholera", by George Todd, Esq., of West Auckland, were read by Dr. McWilliam.

Monday, November 5th. An Introductory Address "On Animal Effluvia, and their Effects on Health", by R. D. Grainger, Esq., F.R.S., was delivered by the author.

Monday, December 3rd. A Paper "On Puerperal Fever", by Professor Murphy, M.D., was read by the author.

Monday, January 7th, 1856. A Paper "On the Prophy-

laxis of Cholera by some of the Vegetable and Mineral Acids", by J. H. Tucker, Esq., was read by the author.

Monday, February 4th. A Paper entitled "Observations on the Cholera Epidemic that occurred in 1854 at St. Laurent D'Aigonze", by Monsieur Reymond Fallot, translated from the French by Dr. Camps, was read by the translator.

Monday, March 3rd. A Paper "On the Pathology of Cholera", by Philip B. Ayres, M.D., was read by the author.

LABOURS OF COMMITTEES.

Cholera Committee. This Committee have received from the Home Office replies to the queries sent out to the Black Sea fleet: but from some cause, as yet unexplained, the replies from the Baltic fleet have not yet come to hand. The analysis of the papers from the Black Sea has been left by the Committee in the hands of Drs. Babington and McWilliam, whose report will be published in the *Transactions* of the Society.

The Hospitals Committee have received a number of replies to the queries issued by them; but from the extensive scope of the inquiry which the queries embrace, it has been considered that the observations of one year, or even of two years, however carefully recorded, cannot form a reliable basis for a report upon so large and so important a subject. The Committee have, therefore, recently issued further sets of their queries to the naval and military hospitals at home and abroad, as well as to the metropolitan and provincial hospitals of the kingdom.

Epizootic Committee. The Report of this Committee has been received, and will shortly be published.

Nurses Committee. During the last twelve months the Nurses Committee have been employed in obtaining the opinions and assistance of such influential persons as were in a position to further the objects of the Committee. They have corresponded with masters of workhouses, numbers of the clergy, the various visiting societies of the London parishes, etc., and are still in correspondence with some. A deputation from the Committee having had an interview with the Earl of Shaftesbury regarding their scheme, his Lordship consented to introduce them to the Poor-Law Board, in order there to explain the views and objects of the Committee. The Committee have also prepared the formulæ of such certificates, registers, etc., as would be required in the various workhouses, should the scheme they propose be followed out.

Small-Pox and Vaccination Committee. Since the last Annual Report of the Council, the Committee on Small-Pox and Vaccination have exerted themselves in pressing upon the Government the adoption of the principles put forth in the "Memorial on a proper State Provision for the Prevention of Small-Pox and Extension of Vaccination", which was presented by the Council to the General Board of Health in February 1855, and in urging on them the necessity of introducing a Bill to carry these principles into effect. Although, for various reasons, the Government were not able to take up the subject during last session of Parliament, they admitted its great importance, and the necessity for their early interference; and almost on the first night of the present session the President of the General Board of Health gave notice of his intention to introduce a Government Vaccination Bill, and this Bill has since been introduced and read a second time. In the preparation of it the suggestions contained in the memorial of the Council, just alluded to, received full attention, and every disposition was manifested on the part of the Board of Health to give them effect. It is certainly a matter of great regret to the Council that in one important, and indeed fundamental particular, their views have not been carried out, and that Public Vaccination is not separated at once and altogether from the Poor-Law administration. But in other respects,—in transferring the superintendence from the Poor-Law Board to the General Board of Health,—in providing for medical supervision,—in extending the compulsory provisions of the present law, and supplying a working machinery,—and in increasing the remuneration of the public vaccinators, and thereby stimulating them to greater exertion, so much is done to secure more extended and more efficient vaccination, that the Bill is well worthy the zealous support of the Society, and of the profession at large. And the Council, feeling that its introduction by the Government is certainly, in great measure, due to the exertions they have made, think that if this Bill should pass into a law, they will have good reason to congratulate themselves on the result. The Council have suggested certain amendments of detail in a report recently presented to the Society, and adopted by it, and means are now being taken to give these suggestions effect.

COMMUNICATIONS FROM ABROAD,

The Foreign and Colonial Secretaries continue to receive communications of value from their correspondents abroad, and in the colonies.

Some interesting official papers on cholera have been forwarded to the Society by the Government Board of Medical Officers at Christiana, in Norway; and a communication on the same subject has been received from Dr. Leviseur, Government Physician at Posen, in Prussia. Several valuable papers on the progress of cholera and yellow fever in Brazil have, through the courtesy of the Earl of Clarendon, been received by Dr. McWilliam.

It is to be regretted that this last named country after a century's immunity from epidemic disease in any form, was invaded by yellow fever in 1850, and has recently suffered and is still suffering very severely from cholera. With a suddenness of invasion, and capriciousness of progress not unusual, this scourge made its appearance at Para, situated near the equator, on the 25th of May last, and, spreading to the surrounding districts, speedily ascended the Amazon, becoming, however, milder in its progress up the river.

About the middle of July, or seven weeks after the outbreak of the disease at Para, cholera appeared at Bahia, skipping over Maranham, and all the other intervening ports, on a coast extending over between seven and eight hundred miles; and a few days later it had reached Rio de Janeiro, the capital of the empire, in lat. 23° S. At both places its ravages have been severe. During the months of September and October, the mortality in Rio alone averaged from sixty to seventy deaths a-day.

The total mortality in Rio de Janeiro up to December 4th, 1855, was as follows:—In the white population, amounting to 142,403, the deaths from cholera were 1,131; in the coloured population, amounting to 124,063, the deaths from cholera were 2,368. In other words, the whites died in the ratio of 1 in 126 of the population, while the coloured people lost 1 in 52·4; a result the reverse of what took place during the yellow fever visitation; for on that occasion the whites died in a proportion immensely beyond that of the blacks. From later accounts received from Consul Cowper, cholera and yellow fever were committing great ravages at Pernambuco.

Some mortuary returns, and other documents, have been sent to the Society by the Medical Board of Bombay.

The Council expect some answers from the Presidencies of India to the queries of the Cholera Committee, which were forwarded to India by the Hon. the Court of Directors.

The Honourable Court, who supplied the Society in 1854 with several valuable manuscript reports, and other printed

official documents relative to the epidemic diseases of India, were pleased to inform the Society, in the letter accompanying these documents, that the several Governments of India had been instructed to keep their attention directed to the subject of epidemics. Sufficient time has not yet elapsed for either the Court or the Society obtaining the results of any investigations on this subject, or returns of those meteorological observations instituted for the purpose of obtaining a deeper insight into the atmospheric causation of widely diffused diseases, and in relation to the morbific agencies and seasons, and the isothermal lines and distribution of moisture within the tropical zones throughout India and her dependencies. The results of such topographical and meteorological researches promise so much conducive to the knowledge of epidemiology, that the Society cannot but express a hope that subjects so important and interesting may not be lost sight of by the Honourable Court. The necessities and circumstances of the war, that gave rise to the employment of the medical and military officers of the East India Company's service in the ranks of the Turkish Contingent, brought forward a new field for medico-military observations on epidemics in connexion with India, from which the Society may expect to receive much useful information.*

The conference of Paris, upon which the attention of the world was, for some weeks, earnestly fixed, having resulted in the adjustment of the Eastern question, and in the consequent establishment of peace in Europe, we may now confidently look forward to the time when some harvest will be gathered in from the rich fields of epidemiological inquiry presented by Turkey and the Crimea during the last two years.

The first outbreak of cholera and fever among the troops at Varna in 1854; the sudden and rapidly destructive visitation of cholera in the Black Sea fleet; the reappearance, after a partial subsidence, of cholera with increased violence in our army in the Crimea, shortly after the battle of the Alma; the ravages committed by cholera, dysentery, and other diseases, while the army was besieging Sebastopol; the comparative exemption from disease of the naval brigade employed in the same duty during the terrible winter of 1854-5; and the re-establishment of the same army to a state of health

* Since this Report was written, a large packet, containing replies to the "Cholera Queries", has been received from India by Dr. James Bird, the Secretary for India, through the Honourable the Court of Directors.

which has no parallel in the annals of war*—are matters of transcendent importance to the statesman, the general and the medical historian, which ought to be traced, as far as possible to their true causes; and the Council trust they will receive, as they unquestionably deserve, the most patient, full, and rigorous investigation.

Dr. Bryson has already furnished us with some account of the cholera in the Black Sea fleet; and, as has been already stated, the replies to the queries sent to that fleet will be, in due time, laid before the Society. Various other papers on the same subject have, from time to time, appeared in the medical journals of the day. Much, however, is yet wanted to form a complete "Medical History of the Crimean Expedition."

From the officers of the naval and military medical staffs; from the medical officers serving in the various contingent forces during the recent war; from the physicians and surgeons that were employed in the civil hospitals in the East; and from the sanitary commissioners, one of whom is a most zealous and active member of this Society; from all these the Council hope that, in due time, most valuable additions will be made in relation to the nature, causes, and, consequently the prevention of those epidemics to which armies and other large congregations of men have, in all times, been peculiarly subjected.

THANKS OF COUNCIL.

The Council have, in conclusion, the pleasure to acknowledge many valuable additions to the library of the Society, upwards of fifty volumes having been presented during the year. They have again gratefully to record their thanks to that unwearied benefactor of the Society, Sir C. Mansfield Clarke, Bart., for another donation of £10 to the funds of the Society. Their best acknowledgments are also due to the general and professional press for giving publicity to their papers, giving abstracts of the proceedings, and in other respects forwarding the objects and interests of the Society; and to the editors of the *Veterinarian*, of the *Assurance Magazine*, and of the *Pharmaceutical Journal*, for the presentation of their respective journals to the library.

* This may be allowed to have been said not unadvisedly, seeing that in one of the Weekly Returns of the Health of our Army in the Crimea, within the last two months, amounting to 53,000 men, not a single case of death was recorded.

Papers and Communications.

ON CONCURRENT SCARLET FEVER AND MEASLES.

By W. B. KESTEVEN, Esq., F.R.C.S.

If eruptive fevers always presented precisely the characters attributed to them in books, we might have cause to wonder that our forefathers should have experienced any difficulty in distinguishing between them. We should be justified in expressing amazement that Rhazes found it necessary to be very explicit in drawing the distinction between small-pox and measles—a distinction drawn so faithfully, that the practitioner of the present day may discover therein a picture of the difficulties that he has most probably himself encountered at the bedside. We might be somewhat incredulous when told that Sir Robert Sibbald hesitated to give an opinion upon cases of epidemic Scarlatina in Edinburgh in 1680; we might feel at a loss to account for the great renown that was, nevertheless deservedly, accorded to Dr Fothergill for having distinctly traced the affinities of an epidemic Scarlatina Anginosa; we should have had some reason for expressing distrust of the acuteness of apprehension of those among our ancestors who could have confounded measles, small-pox, and scarlatina.

That this regularity, or uniformity, however, does not exist in nature, a not very long experience will soon discover to the practitioner. Difficulties of diagnosis have, within a period of the last three or four years, frequently happened to the author in regard to scarlatina and measles. His number of cases, however, not having been sufficiently great to serve the purpose of any useful statistical comparison, the writer has contented himself with stating the general features of the cases to which he refers, as illustrated by the subjoined (as they may be termed) representative cases.

In the month of September of this year the writer attended five children in a house in Albany Street, Regent's Park. In each case there was indisposition for four or five days, consisting of simple febrile or catarrhal symptoms, with cough, coryza, watering and redness of the eyes. On the fourth or fifth day the severity of the symptoms abated coincidently with the appearance of an eruption of a dull reddish colour, not, to the sense of touch, elevated above the surrounding cuticle; when viewed through a lens about a quarter of an inch distance, many of its apices appeared to be desquamat-

ing on the second day. At first it looked very like the early eruption of confluent small-pox, but wanting the raised hard and granular feeling to the finger of that disease. The eruption was scattered over the body and limbs. On the face, neck, chest, and arms, it presented the irregular shaped clusters seen in measles. The tongue was furred, and its apex was as red as a boiled lobster. The throat, in three instances was slightly sore, and was of a scarlet colour. The pulse was rapid, but soft. The bowels rather costive. Urine scanty, but not high coloured; and free from albumen.

These were the most prominent features observed. The variations were, that in two of the children the eruption was more distinct, the spaces of clear skin between the spots being of greater extent. Head symptoms were seen in one child, subsiding with the fever and eruption. The eruption continued apparent for from three to five days, and then rapidly disappeared; the cuticle subsequently desquamating as in scarlatina. An interval of a fortnight occurred between the subsidence of the disease in three of these children, and the first appearance of the symptoms in the two youngest. A period of two days only intervened between each case of the three eldest. Some of the children in this family had been to a school where several of their schoolfellows were absent on account of illness—said to be measles. The author had himself attended the elder children in measles two or three years previously.

Irregularity, very similar to that described in the preceding cases, as already stated, has been met with on many occasions during the last three or four years. In some cases the first symptoms have corresponded less to those of measles than above related.

The cases here recorded are regarded by the writer as furnishing instances of the concurrence of measles and scarlatina, the symptoms respectively of each of these fevers masking those of the other, and causing embarrassment to the diagnosis. They have, in most instances, presented a striking resemblance to the description of measles given in his *Practice of Medicine* by Cullen as that met with in his day; while they possessed also the undoubted characteristics of scarlatina.

This conjunction of eruptive fevers, if admitted as the correct view of these cases, presents an exception to the principle so emphatically laid down by John Hunter, and to a very great extent adopted by his successors, that two different fevers cannot exist in the same constitution at the same

time. There is little doubt, however, that this principle cannot be accepted rigidly and without modification. Many parallel instances have been cited by Mr. Marson from his own experience at the Small-Pox Hospital, and communicated to the Royal Medico-Chirurgical Society in a paper read May 26th, 1847. "Thus", concludes Mr. Marson, "either from personal observation, or from the writings of others, I present examples of the simultaneous occurrence of variola and scarlatina, variola and rubeola, variola and pertussis, variola and vaccinia, rubeola and scarlatina, rubeola and vaccinia, rubeola and pertussis, varicella and vaccinia, pertussis and vaccinia."

Rhazes, as already observed, in his *Treatise upon Small-Pox*, bestows great pains in establishing the diagnosis of that disease from measles, and labours to show that Galen had also accurately distinguished between them In the words of Dr. Montgomery,* "the most remarkable inaccurracy prevailed in former days on this subject (the diagnosis of eruptive fevers), since we find Sennertus, in the middle of the seventeenth century, discussing the question 'why the disease, in some constitutions, assumed the form of small-pox, and in others that of measles;' and in a posthumous work of Diemerbroeck, published in 1687, it is laid down that small-pox and measles are only different degrees of the same affection. The same doctrine was still more recently maintained by Langè, a professor at Leipsic."

Such having been the confused state of the diagnosis of measles and small-pox, we should be prepared to find no less confusion between measles and scarlatina. This is to be observed in the names under which the latter has been known, *e.g.*, morbilli confluentes, rubeola rosalia, febris rubra, enarthesis rosalia. Although Sydenham had completely established the differences between small-pox and measles, the latter and scarlatina continued to be regarded as varieties of the same fever. So gradually indeed did the distinction become recognised, that it is not known by whom the word Scarlatina was first employed.

Dr. Montgomery (*Cyclopædia of Practical Medicine, Art.* "*Rubeola*") observes "in our country Morton maintained the identity of measles and scarlatina, and considered the relation existing between them the same as that between distinct and confluent small-pox. Even so recently as 1769, Sir William Watson confounded these two diseases, the cor-

* Cyclopædia of Practical Medicine.

rect diagnosis of which ought probably to be referred to the time of publishing the second edition of Dr. Withering's *Essay on Scarlet Fever* in 1793." So closely do specific eruptions sometimes run into each other, that Van Swieten, in his commentaries upon Boerhaave's aphorisms, regards measles and scarlet fever as being allied to erysipelas.

The preceding brief review of the history of the diagnosis of these two eruptive fevers, furnishes presumptive evidence that scarlatina and measles must, in former times, have frequently presented a close resemblance in their features; while the cases recorded as of recent occurrence strengthen that evidence, and show that, as the two fevers may coexist, or closely coincide in the period of their appearance, the fact of their so long having been confused under one name by our ancestors must cease to be matter of surprise on our part.*

ON THE OCCURRENCE OF FEVER AT COWBRIDGE, GLAMORGANSHIRE, IN THE AUTUMN OF 1853.

By WILLIAM CAMPS, M.D.; one of the Foreign and Colonial Secretaries of the Epidemiological Society of London.

(*Read before the Epidemiological Society, April* 2, 1855.)

Towards the end of the year 1854, in consequence of an outbreak of cholera at Bridgend, in Glamorganshire, I visited that place by order of the General Board of Health. Whilst I was there my attention was, on several occasions, directed to the occurrence of a fever in the autumn of the year preceding at Cowbridge, in the same county, a small town situated at the distance of seven or eight miles from Bridgend, and constituting a part of the same union, under the name of the Bridgend and Cowbridge union. There are

* Since the preceding observations were read at the Epidemiological Society, the attention of the author has been directed to a paper in the *Medical Times and Gazette* (Nov. 6th, 1852) on "Scarlatina Morbillosa (Rubeola)," by his friend Dr. Tripe. In the same journal (Nov. 1852), a case of a like character is reported by W. M. Clarke, Esq., from the Bristol General Hospital. Some correspondence on Epidemic Rubeola has also subsequently been published in the *Lancet* (May, June, July, of the present year), by Dr. Willshire, Dr. Tripe, *Scotus*, and the author. Dr. Willshire's object has been to point out the distinctions between Rubeola and Morbilli on the one hand, and Scarlatina on the other;—a distinction, as observed by Dr. Willshire, previously made by Dr. Copland, and by German pathologists.

several interesting as well as remarkable features connected with this outbreak of fever; and as there exists at present, to my knowledge, no authenticated record of this epidemic, drawn up by medical authority, I have been requested by Dr. Gavin Milroy to present this notice of that epidemic to the Epidemiological Society.

Cowbridge is a small town, situated between Bridgend and Cardiff, eastward of the former place, although not on the line of railroad connecting those two places, but on the road still in use for horse and carriage conveyance. Its population does not greatly exceed one thousand persons.

As in many other towns, horse races are held at Cowbridge at regular periods; and at the races held here, it has been the custom for a long time for the gentry of the surrounding neighbourhood to assemble together at one or more balls, during what is termed the race week, which is thus made a season of unusual gaiety and festivity for the inhabitants of the place and its adjacent neighbourhood. I have been told that these races, with their accompanying balls, are, for the most part, held at the early part of the month of November. In the year 1853, in that month, and during the race week, there were two balls, separated by one intervening night; and it was immediately after these two balls that many of those who were present at them were seized with symptoms of alarming disorder, which, in not a few cases, terminated fatally. So far as I could learn from repeated inquiries whilst in the neighbourhood, and from various persons, some of whom had formed part of the gay assembly, this disorder assumed the character of a very malignant fever.

Among the striking particulars connected with the Cowbridge fever, it was especially observed that no matter from what part of the country those came who attended these balls, or to what part they returned, nearly all suffered afterwards, and some died of a disorder described as fever. Thus, I was informed that some members of different families returned to Devonshire or Somersetshire, some to one of the midland counties, to Yorkshire, and, I think it was stated (but of this I cannot be positive), that one or more returned to Scotland from Cowbridge; of these, most fell ill, and suffered from long and severe indisposition, attended with extreme depression and prostration of strength, of which two or three died. These balls were held on this occasion, as I believe is customary at such towns, at the chief inn in the place, and in rooms partially, if not altogether, fitted up as was then required. It will be seen from the following ex-

tract from the report of the Inspector of Nuisances of the town of Cowbridge, that the supper room was a temporary erection; and previously to the ball, it was a loft over a seven-stalled stable. The inspector, in his report, under head No. 39, remarks as follows:—

"I inspected the Bear Inn premises, and could not find any drain that had been recently opened. There is one water closet in the house supplied with water, which flushes the contents through the various drains connected with the house, and from thence to the town ditch. I found the passage connecting the ball room with the supper room had been recently erected with boards covered with paper; this passage was partly built over a tank of water, which drains from the roof of the premises, and is used for house purposes. The supper room, previously to the ball, was a loft over a seven-stalled stable; the ceiling of the supper room was constructed of boards covered with white calico. The supper room appeared to have been recently papered; the walls were dry, and the plaster seemed to be of several years standing. I examined the flooring of the supper room, and found no steam could arise from the stable underneath. I examined the stable under the supper room, and found nothing but surface drainage there. There was an offensive smell arising from a privy in the passage leading from the stable to the house. The landlord stated that the smell was caused by the privy being emptied the morning of my inspection, which I afterwards found to be true. There seems to be a good supply of water from the tank, and a pump which flushes all the refuse through the drains leading from the house into the town ditch. The landlady is now ill in bed with fever."

As might be reasonably expected, there are some discrepancies in the statements made by different persons, in regard to the number of individuals of both sexes who were present at these balls, as well as to the number of those who became ill afterwards, and even of those who died from the disease with which they were attacked. Yet, in the main, there is a tolerably good amount of agreement between them all; so that the various statements are in nowise invalidated by each other. It must be remembered, that twelve months had elapsed from the time of the occurrence of this outbreak of fever to that at which I visited the neighbourhood; and by a singular coincidence, I was there, even in the town itself, on the anniversary of these races and balls, a period not unlikely to revive in many minds the lamentable occur-

rence of the preceding year. I was on many occasions in the company of persons, of both sexes, who had been present and had taken part in the amusement; one of these was a very intelligent medical practitioner residing in the neighbourhood, who had, in the discharge of his professional duties, been called upon to attend many of those who were attacked. I saw the sister of one who died; and another lady who was present, and who was attacked with the fever, from which she was long in recovering. The medical gentleman, already referred to as having been in attendance on several of the sufferers, as well as all other authorities from whom I could gain information respecting this disease, described it as typhus fever of a very low, malignant type, and characterised by symptoms of extreme debility and prostration of strength, requiring tonics and stimulants, and in many cases, more especially the fatal ones, accompanied by hæmorrhage from the bowels. One authority stated, that nearly one hundred and forty persons attended these balls; others told me the number present did not amount to more than one hundred persons. At the distance of time from the occurrence of the outbreak of the epidemic, when I was thereabouts, it was by no means easy to procure exact statistics as to those who were present, those who were taken ill afterwards, those who recovered, and those who died; but that several persons of both sexes succumbed under the attack, there can be no doubt; and from the evidence that I was able to collect, it may be fairly inferred that, at least in six or eight instances, if not more, this fever proved fatal, and that too, be it remembered, in a class of persons, who, when ill, from whatever cause, could and would secure for themselves all that medical skill, combined with domestic and hygienic accessories, might be expected to accomplish, towards restoration from the malady under which they suffered.

QUARTERLY REPORT OF THE PROCEEDINGS.

PAPERS READ AT THE ORDINARY MEETINGS.

Monday, July 7th, 1856. "On the Principles of Inductive Philosophy as applied to the Study of Epidemics." By B. W. Richardson, M.D.

Monday, August 4th, 1856. "Report on Cholera which visited Her Majesty's Black Sea Fleet in the Autumn of 1854; compiled from the Returns of the Medical Officers of the Fleet to Queries drawn up by the Cholera Committee of the Epidemiological Society, and sent out by order of Government." By B. G. Babington, M.D.

In the discussion which followed the President's paper, Dr. Milroy observed on the remarkable immunity of the officers, as compared with the men, from attacks of cholera in those vessels of the Black Sea fleet which had suffered the most. He was not surprised at this himself, and in his opinion the cause was sufficiently obvious, viz., the much larger amount of breathing space in the quarters of the former, more especially at night, when the necessity for pure air is even greater than during the day. He had carefully gone over the *Royal Albert* and the *Queen*, the admirals' ships at the Kameisch and the Bosphorus, in company with the medical officers, in the latter case with Dr. Deas, the Inspector-General of the fleet, whose views entirely concurred with his own. Take the case of a three-decker with 1,000 or 1,200 men on board. More than two-thirds of them are stowed away on the lower deck, which is necessarily the worst ventilated, whilst the rest, consisting chiefly of the marines and boys, are berthed in part of the middle deck. The whole of the upper deck and one-half of the middle deck are left quite free and unoccupied. There was no good reason why so much space should not be made available for the comfort and the health of the men at night, and he trusted that ere long it would be made use of at all times. He had spoken with the medical officers, and with the captains and lieutenants on this subject, and he had found that it was only because it had been always the practice in the service, that no change was made, for all admitted that the atmosphere in the between decks, after the men had turned into their hammocks, was most disgusting. Such being the case, could we wonder that diseases like cholera and yellow fever sometimes prevailed to a frightful extent in vessels of war?

The history of the terrible outbreak in the *Britannia* at Varna, in 1854, was a melancholy example. All the ports of the lower deck had been shut, in consequence of the weather becoming stormy, and the result was, that the air which the men breathed was positively pestiferous. The ventilation of the between decks in all ships might be much improved, and by very simple means, when the ship was being built; but, unfortunately, little or no attention was paid to this point by shipwrights, and everything was sacrificed, either to mere appearance, or the working of the guns, or the stowing away of the stores or cargo. In closing his remarks he would offer one practical hint, which he believed to be of great importance, viz., that whenever a ship of war happened to be in, or to arrive at a place where any epidemic disease existed, the crew should immediately be spread over all the available space in the different decks. In some cases, as when the vessel is lying in port, it may even be advisable to have some of the crew to sleep on the spar deck, under an awning; disease would then be often prevented altogether, and at all events be very materially diminished. No other sanitary appliance could be of much avail if the free and abundant supply of fresh air to the men at night was not attended to.

PRESENTATIONS.

"Memoir on the Cholera at Oxford in the year 1854", by H. W. Acland, M.D. Presented by the author.

"India as it ought to be", by Major William Hough. Presented by the author.

NEW MEMBERS.

The following gentlemen have been elected members of the Society during the quarter:—

Resident Members.—J. W. Tripe, M.D., King's Cross, Commercial Road; C. J. B. Aldis, M.D., 1, Chester Terrace, Chester Square; Thomas Ansell, M.D., Harley Place, Bow; John Challice, M.D., Bermondsey; Henry Northover Pink, Esq., M.R.C.S., Greenwich.

Corresponding Members.—A. Von Iffland, M.D., Beaufort, New Quebec; W. Isidore Cox, Esq., M.R.C.S., Hindley, near Wigan, Lancashire.

Table in connexion with a Report on Cholera in the Black Sea and Baltic Fleets in the Autumn of 1854.

BLACK SEA FLEET.

Name of Ship.	Kind of Vessel.	Name of Surgeon.	No. on board.	Officers.	Seamen.	Stokers.	Marines.	Officers attacked.	Seamen attacked.	Stokers attacked.	Marines attacked.	Officers died.	Seamen died.	Stokers died.	Marines died.	Situation of ship when attacked.	Date of First Case.	Water used in Cooking and Drinking.	Place and time of Supply of Bread, Milk, Fruit, and Vegetables.
Sidon	Stm. frigate.	W. R. Dalton. +Charles F. A. Courtney.	297	36	213	—	48	0	8	—	3	0	6	—	2	Just arrived at Kustenjeh from Baltschik.	August 13	Water from Baltschik.	From Baltschik, the day before the first case occurred.
Banshee	Stm. vessel.	None. +James Ross.	60	10	28	14	8	0	0	0	1	0	0	0	1	Constantinople.	November 24	Wells at Constantinople.	Daily from Constantinople.
London	Second rate.	John Douglas, M.D. +A. Irwin. +*Acting* John Coogan.	812	39	589	—	184	1	14	—	9	0	6	—	6	Baltschik.	August 4	Running stream near Baltschik.	From Baltschik during the first nine days of August.
Firebrand	Stm. frigate.	Hugh O'Hagan, M.D. +Edward McSorley.	194	24	142	—	28	0	2	—	0	0	2	—	0	Bay of Varna.	August 15	Constantinople, from a cistern supplied by Belgrade aqueduct.	From Constantinople, where cholera existed at the time.
Vulcan	Steam troop ship.	James Peters. + None since previous May.	165	22	129	—	14	0	1	—	0	0	0	—	1	Constantinople.	September 26	Distilled water, and water from the shore.	From various places when moving, but chiefly from Constantinople.
Niger	Stm. corvette.	F. Stupart. +W. V. E. Reynolds.	170	22	106	22	20	0	1	1	1	0	1	0	1	Crimea, at the river Alma.	September 23	Distilled water.	None obtained.
Highflyer	Screw steam ship, 21 guns.	William Kerr, M.D. +Alexander Watson, M.D.	236	29	179	—	28	0	1	1	0	0	0	0	0	Western coast of the Crimea.	September 30	Distilled water.	At Balaklava. The crew were in daily communication with the shore, where cholera prevailed.
Agamemnon	Screw steam ship.	George Mackay, M.D. +Edwin T. Watkins.	867	40	595	Engs. 7 Stkr 33	192	0	12	0	15	0	8	0	14	Buyukdere Bay.	August 4	From shore at the Bosphorus, afterwards at Baltschik and Varna, lastly distilled water.	At Buyukdere in the beginning of August, then at Baltschik and Varna.
Queen	First rate.	John Munro, M.D. +William Telfer. +John Rorie.	963	47	720	—	196	0	4	—	2	0	4	—	2	Baltschik.	July 5	From iron tanks.	In small quantities from Baltschik.
Cyclops	Stm. frigate.	None. +Charles F. Williams.	90	14	68	—	8	0	5	0	0	0	2	—	0	Constantinople.	August 16	From Constantinople.	Bread and milk, but no fruit, from Varna.
Megæra	Iron screw steam troop ship.	James Fisher, M.D. + None.	155	17	102	22	14	0	3	0	0	0	2	0	0	Baltschik.	September 6	Partly spring, partly distilled.	None.
Wasp	Screw steam sloop.	M. Walling. +George P. Cooke.	165	18	129	—	18	1	3	—	1	1	0	—	1	Balaklava.	October (date not given)	Distilled water used, except by those employed in the trenches, who had very bad water.	Free communication with the shore. Supply of vegetables very scanty.
Furious	Stm. frigate.	R. Fulton, M.D., ill at commencement of cholera; A. Watson, M.D., *Highflyer*, did duty.	217	24	165	—	28	0	17	7	2	0	10	6	2	Baltschik Bay.	August 9	From the watering place one mile south of Baltschik, good and fine.	Vegetables from Baltschik. Bread scantily supplied.
Leander	Sail. frigate, fourth rate.	Edward Nolloth, M.D. +Frederick W. Blake. +W. J. Baird, M.D.	500	34	396	—	70	1 Boatsw.	29	—	8	1	15	—	5	Old Fort Bay.	September 20	Springs of Varna and Baltschik, latter mixed with animal matter, the flocks and herds using the springs.	From Baltschik and Varna, where cholera prevailed among the troops.
Vesuvius	Steam sloop.	John H. Pattinson. +Gilbert King.	155	20	115	—	20	0	5	1	0	0	3	0	0	Off Sulina mouth of Danube; previously off Baltschik.	August 12	Chiefly from Sulina mouth of the Danube; was sometimes a little brackish.	At Baltschik, from August 5th to 11th, these were procured.
Rodney	Second rate.	C. R. Kinnear, M.D. +William Duirs, M.D. +Archibald Stevenson.	789	41	569	—	179	0	21	—	5	0	6	—	2	Baltschik.	August 10	Pure water from a spring at Baltschik.	In small quantities from Baltschik.
Terrible	Stm. frigate, fifth class, 21 guns.	Howard R. Banks. +David Henry Wright, M.D.	300	32 7 are engineers.	183	36	49 includ. 1 officer.	0	2	—	1	0	1	—	0	Off Cape Loukoul, Crimea.	September 19, 3·30 A.M.	From a small stream at Baltschik. Its qualities stated at large.	All obtained from Baltschik and Varna.
Sans Pareil	Screw steam third rate.	James Donovan, M.D. +John T. U. Bremner, M.D. +Richard B. Power.	630	40	446	22	122	0	13	—	12	0	7	—	5	At anchor at Varna, then at Balaklava, and off the Katchka, Crimea.	July 31	Distilled water and water from the shore used indiscriminately.	Men could procure all these from the shore at Varna.
Retribution	First class fifth rate stm. frigate.	Augustus Slight. +Henry S. Edwardes.	300	20	231	—	49	0	1	—	1	0	1	—	1	Cruising in lat. 43·06, long. 38·23.	August 13	Water taken from a running stream.	Daily obtained from the shore at Kavarnah Bay when the fleet was there.
Trafalgar	First rate.	*Acting* David Lloyd Morgan. +Robert Creighton.	963	39	728	—	196	2	92	—	31	2	30	—	8	Anchored off Baltschik.	August 9	From a stream at Baltschik, running thro' calc. cliffs, disc. from org. matter, used by Bosquet's Div. for washing.	Obtained in abundance from Baltschik.
Albion	Second rate.	Richard Mason. +G. Mason, M.D. +John F. Pritchard.	790	38	581	—	171	1	72	—	24	0	50	—	18	At Baltschik.	August 9	Spring at Baltschik, a good deal surcharged with lime.	Supplied from Varna and Baltschik.
Bellerophon	Third rate.	Dr. Mackay, Mr. Costello; subsequent to cholera, Dr. Carmichael. +Dr. Brown, +Dr. Fisher.	650	40	458	—	152	0	9	—	6	0	7	—	1	Varna.	July 31	Water obtained from Baltschik and Varna.	Had been obtained from Varna daily.
Britannia	First rate.	John Rees. +J. W. Elliott; +H. H. Smith, M.D.; and +A. Irwin.	1054	54	782	—	218	0	169	—	60	0	98	—	41	Baltschik.	August 9	From a rapid stream from the hills a quarter of a mile below Baltschik.	From Baltschik and Varna.
Vengeance	First class second rate.	William Graham, M.D. +John Ward. +William B. Stephens.	740	38	523	—	179	0	18	—	11	0	8	—	9	At anchor off Baltschik.	August 8, 9 P.M.	Spring at Baltschik.	From Baltschik.
Inflexible	Paddlewheel steam sloop.	John Watt Reid. +George F. A. Drew.	195	27	98	23	47	No cholera cases occurred; but diarrhœa was prevalent, and successfully treated with lead and opium pills of the Edinburgh Pharmacopœia, given every half hour till the disease abated.								Constantinople, Baltschik, Varna, and with the fleet in Aug. & Sept.	No cholera.	Spring water.	Not mentioned.
Triton	Iron steam vessel.	None. +John Forbes.	63	9	48	—	6	No case of cholera occurred. The first case of diarrhœa occurred at Varna; and during the continuance of this diarrhœa, the vessel was at Baltschick and Varna, or at sea with the fleet. Two officers, sixteen seamen, and two marines, were affected.								At Varna.	First case of diarrhœa Aug. 5	From a small stream at Baltschik.	Onions only were obtained from Baltschik. No bread or fruit.
Spitfire	Third class stm. surveying vessel.	Robert Willcox.	66	9	50	—	7	No cholera. Thirty-eight cases of diarrhœa were placed on the sick list during the months of July, August, and September. The symptoms did not differ from those ordinarily observed, and they yielded easily to ordinary remedies.								Position frequently changing.	38 cases of diarrhœa during July, Aug., Sept.	From Varna Lake, from south side of Varna Bay, and from Baltschik.	Fruit and vegetables disallowed. Bread and milk occasionally from Varna and Baltschik.
Spiteful	Steam sloop.	Vans C. Clarke, M.D. +Doyle M. Shaw.	135	17	99	—	19									At anchor near *Leander* at Eupatoria, Oct. & Nov. when *Leander* suffered.		Brought in casks from Eupatoria, and very good both for cooking and drinking.	Chiefly from Eupatoria.
Beagle	Steam gun vessel.	+William H. Cameron.	65	10	47	—	8									Arrived in Black Sea when cholera in squadron had almost ceased.		Distilled water.	In September at Malta. In September and December at Constantinople.
Arrow	Despatch gun boat.	+P. W. Govett.	65	8	37	11	9											Chiefly distilled water.	At Malta, Constantinople, and Eupatoria.
Caradoc	Stm. vessel.	+Charles McShane, M.D.	65	11	47	—	7												
Apollo	Store ship.	+Richard J. Squire.	90	10	70	—	10	In these vessels there was neither cholera nor diarrhœa.								Baltschik Bay, where the disease was raging between Aug. 11 & 29.		Water obtained at Malta.	Inferior bread from Baltschik. Fruit not allowed.
Fury	Steam sloop.	John Stirling, M.D. +Henry Harkan.	160	22	118	—	20											From a rivulet at Baltschik; also distilled water.	Got from shore occasionally.
Modeste	Sloop.	Alexander Mitchell, M.D. +E. Pearce (not on board).	141	13	107	—	21												Obtained fresh provisions chiefly from Corfu.
Viper	Screw steam gun vessel.	None. +T. J. Haran.	65	10	47	—	8												
Total			12,372	884	8945	190	2353	5	502	10	193	4	267	6	120				

BALTIC SHIPS.

Name of Ship.	Kind of Vessel.	Name of Surgeon.	No. on board.	Officers.	Seamen.	Stokers.	Marines.	Officers attacked.	Seamen attacked.	Stokers attacked.	Marines attacked.	Officers died.	Seamen died.	Stokers died.	Marines died.	Situation of ship when attacked.	Date of First Case.	Water used in Cooking and Drinking.	Place and time of Supply of Bread, Milk, Fruit, and Vegetables.
Wrangler	Steam gun vessel.	+William E. O'Brien.	65	9	48	—	8	0	1	—	1	0	1	0	0	At Woolwich.	August 3	Pump water at Woolwich.	At Copenhagen during the prevalence of diarrhœa.
Hannibal	Second rate screw steam ship.	John J. Crawford, M.D. +A. R. R. Preston. +C. G. Woolfender.	620	41 27 Fr.	436 977 Fr. troops.	—	143	0	38	—	8	0	15	—	1	At sea in the Baltic, lat. 56 N., long. 5·43 E.	August 1	Distilled water.	From Copenhagen.
Algiers	Second rate screw steam ship.	John Andrews. +James S. Ayerst.	646 460 Rus. prisonrs	42	465	—	139	—	1	—	0	0	0	—	0	At sea, but previously at anchor in Ledsund.	August 20	Principally distilled water.	Fresh beef and vegetables were had from transports.
Sphinx	Sixth rate steam ship.	+John Hickens.	166	25	121	—	20									In the Baltic.		No answer.	No answer.
Stromboli	Paddlewheel steam sloop.	F. Negus. +J. S. Adams.	160	21	77 Boys 24	18	20									In the Baltic.		From tank vessel at Gottland.	Vegetables from Elsinore, Gottland, *Duke of Wellington*, and *Bulldog*.
Gladiator	Stm. vessel, sixth rate.	D. Hunter, M.D. +D. Porteous, M.D.	159	22	108	—	29	Baltic ships not visited by either cholera or diarrhœa.								In the Baltic.		No answer.	No answer.
Valorous	Stm. frigate, sixth rate.	Stn. Bowden. +William Ray, M.D.	217	23	169	—	25									In the Baltic.		No answer.	No answer.
Total			2033	183	1448	18	384	0	40	—	9	0	16	0	1				

+ This mark denotes Assistant-Surgeons.

TRANSACTIONS

OF THE

EPIDEMIOLOGICAL SOCIETY OF LONDON.

Papers and Communications.

REPORT ON THE CHOLERA WHICH VISITED HER MAJESTY'S BLACK SEA FLEET IN THE AUTUMN OF 1854.

By B. G. BABINGTON, M.D., F.R.S., President of the Society.

ELABORATE and numerous as have been the reports and investigations promulgated from various places in this and other countries with relation to Asiatic Cholera, there yet has remained a source of information freer from the contamination of preconceived notions and prejudices, and furnishing therefore more reliable data than most others for studying the disease, from its first outbreak to its final disappearance. I allude to information supplied by our brethren on board her Majesty's fleets in the Black Sea and in the Baltic, where cholera was so prevalent and so destructive during the autumn of the year 1854.

Every man-of-war has one or more medical officers on board, who are regularly educated members of our profession, and who have all been proved competent by examination, not only under the Royal Colleges of Physicians or Surgeons of the empire, but likewise under the professional head of her Majesty's Naval Medical Service; they are, therefore, as a whole, thoroughly competent medical witnesses and observers, and at least as likely to be impartial as any other members of our body. They are, moreover, under a strict system of discipline; and whatever they are, in the course of

their service, called on to do, they do it zealously, no doubt, but still as a matter of duty. In placing, therefore, a series of questions before them, the answers they give are likely to be complete, because they are asked through the medium of authority, which they are bound to obey; and those answers, be it remembered, come from gentlemen who are not obtruding on us views and theories which they are interested in supporting, but simply replying to the best of their abilities to questions which have not originated with or been suggested by themselves. It will be at once perceived that information of this kind, all bearing upon the same points of inquiry, and yet supplied by numerous medical men in isolated positions, and holding no necessary communication with each other, must have a peculiar value; so that, if ever the cause of this mysterious epidemic is to be discovered, it is highly probable that it will be through the medium of some such investigation as that of which this report records the result.

Nor is the nature of the testimony, independent as it is, the only peculiarity in reports from naval medical men. The circumstances with which that testimony is connected are peculiar also. Every ship is an isolated assemblage of persons who are always under the eye of their medical officers, and every event bearing on health or disease being as a matter of duty carefully noted, there is afforded an opportunity rarely met with under any other circumstances, of tracing the origin of all deviations from the healthy condition.

In a town, we inquire with especial minuteness into all the circumstances attending the first two or three cases of cholera. They are the most instructive of any. In a fleet, every individual ship is, as it were, a separate town; and these instances of first cases, accurately noted, are as numerous as are the ships in which cholera has occurred. Again, if we consider the crew or inhabitants among whom the disease appears, we find that they are all placed under nearly the same circumstances; or, if there be any difference, as in the case of officers, as contradistinguished from men before the mast; of marines, as contradistinguished from men who go aloft; of engineers and stokers, who lead a confined life, in contradistinction to other seamen, who are constantly exposed to the air; that difference is definite. We know in what work or occupation every soul on board has been engaged; we know to what vicissitudes of climate they have all been exposed; we know precisely what has been their diet and beverage, what the space which has been allotted to each during the hours of sleep; in short, we know more about

them than we can ever hope to know of the inhabitants of any place on shore, how diligently soever medical house to house visitations—so strongly recommended in times of pestilence—may have been carried out. Again, a ship has the great advantage over a town, that its population can be easily moved from place to place, and we therefore have the opportunity of observing whether the cause of cholera exists exclusively in particular veins, currents, or beds of air, or whether it is spread far and wide over a whole region.

It is from these considerations that an examination and analysis of the following reports is undertaken with much interest; and if it be found that they do not give us all the information we seek, we may yet gather from them much that is valuable, and may regard them as affording reliable data for future researches. Lastly, it is under such definite conditions as exist scarcely anywhere but in ships, that fresh endeavours as to treatment can be best carried out; and if any means should prove, on respectable testimony, so successful as to call for further trial under accurate observation, there seems to be no combination of circumstances so favourable for such a trial as is to be met with on board Her Majesty's ships of war.

With these few preliminary remarks, we proceed to give the substance of the Reports from the Black Sea; these being answers to queries which were furnished by the Cholera Committee of our Society. Similar queries were forwarded to Government for transmission to the Baltic fleet, but, except in the case of seven ships which proceeded from the Baltic to the Black Sea, and which consequently received the queries when on the latter station, they never reached their destination; or if they did, the answers have in some inexplicable way disappeared from the offices of the Admiralty and the Board of Health, where every search for them has been made in vain. From the Black Sea, there are altogether 35 sets of answers from the following ships:—

1. Sidon.	13. Furious.	25. Inflexible.
2. Banshee.	14. Leander.	26. Triton.
3. London.	15. Vesuvius.	27. Spitfire.
4. Firebrand.	16. Rodney.	28. Spiteful.
5. Vulcan.	17. Terrible.	29. Beagle.
6. Niger.	18. Sans Pareil.	30. Arrow.
7. Highflyer.	19. Retribution.	31. Caradoc.
8. Agamemnon.	20. Trafalgar.	32. Apollo.
9. Queen.	21. Albion.	33. Fury.
10. Cyclops.	22. Bellerophon.	34. Modeste.
11. Megæra.	23. Britannia.	35. Viper.
12. Wasp.	24. Vengeance.	

Some of these ships had cholera; some had diarrhœa, but no cholera; and some had neither cholera nor diarrhœa; and thus we have been enabled to construct the table which appears at the end of this paper.

The questions which were circulated are as follows:—

1. Name and class of ship.
2. Name of Surgeon.
3. Name of Assistant-Surgeon.
4. No. of Officers.
   ,, Seamen.
   ,, Marines.
   ,, Stokers.
5. Number of cubic feet per individual between decks.
6. Locality and situation of ship when attacked with cholera, and for fourteen days previously.
7. Had bread, milk, fruit, or vegetables been obtained from the shore? If so, when were they obtained, and from what place?
8. Did the crews of boats communicating with the shore, or with shore boats, suffer more, or at an earlier period, than the men who were confined to the ship?
9. Did the disease attack the men of one mess more than in other messes?
10. State the number of officers, seamen, and marines, respectively attacked.
11. The number of fatal cases in each class respectively.
12. Number of cases (if any) without premonitory symptoms.
13. When there were premonitory symptoms, what was their average duration?
14. State the exact date of the occurrence of the first case of cholera or choleraic diarrhœa on board your ship.
15. What appeared to you to be the chief predisposing and exciting causes of the disease?
16. What water was used by the crew for cooking and drinking?
17. If your ship escaped, or suffered but slightly, as compared with others at the same anchorage, or in the same locality at sea, to what do you ascribe such absolute or comparative immunity?
18. Can you state whether the disease had appeared in the Aland Islands previously to the landing of the troops?
19. Can you state whether the disease was more rife in the gulf of Bothnia, or gulf of Finland?
20. Describe the general mode of treatment adopted; and what treatment was most efficacious?
21. Have you any suggestions to offer with respect to prophylactic measures against cholera aboard of ship?

The answers to some of these questions admit of classification under distinct headings, and are given in a table at the end of this paper. There are other answers, however, which do not, readily at least, admit of tabulation, and these we will proceed to consider.

The first of these questions is:—*Did the crews of boats communicating with the shore or with shore boats suffer more or at an earlier period than the men who were confined to the ship?*

This question is answered from the *Sidon*, steam-frigate, in the affirmative: thus—"The boats' crews did suffer more and at an earlier period than the men confined to the ship. The first person attacked was one of the dingy boys, who had been on shore at Baltschik, on the morning of the 12th of August, for sand. He was attacked at 1 o'clock A.M. the following morning."

The *Banshee*, steam-vessel, answers this question by the monosyllable—*no*.

So also the *London*, adding that only three men belonging to boats were attacked at all; but unless we knew how many of her men belonged to boats, we could draw no conclusion from this answer. We only know that the whole ship's company, including officers, amounted to 812 souls, and that of these, 1 officer, 14 seamen, and 5 marines, in all 20 persons, were attacked; which is less than one in forty. If, therefore, there were fewer than 120 men belonging to boats, they had more than their average of attacks among these.

In the *Firebrand*, steam-frigate, the ship's company had leave at Constantinople on the 12th of August, and the only man attacked had been on shore all night and returned intoxicated. It was on the night of the 14th that he fell ill. There was only one other case, that of a boy; who, we are left to conclude, went on shore with the rest, but the date of his attack is not given.

Of the *Vulcan*, steam troop-sloop, the boats' crews were constantly employed at Varna prior to embarking the troops for the Crimea, but the disease did not affect any of them.

In the *Niger*, steam-corvette, no cases occurred among the boats' crews who went on shore in the Danube for fresh meat.

In the *Highflyer*, a large proportion of the men were employed in discharging the cargoes of transports at Balaklava. There were only two cases of cholera in this ship; one was that of a seaman, who had been employed in the working party, and one a stoker, who acted as servant to the Engineer's mess, and had been on shore. Neither of these cases was fatal.

The *Agamemnon* answers *no* to the question; so also the *Queen*, the *Cyclops*, the *Megæra*, the *Wasp*, the *Albion*, the *Britannia*, and the *Trafalgar*; but in this last ship the first case was that of a ship's corporal, who had been on shore on the previous day, and had eaten freely of unripe plums.

The answer from the *Furious*, steam-frigate, is instructive, and shall therefore be given at length.—"Boats' crews did not suffer more than the rest of the ship's company, and they certainly did not take the disease earlier. Of the 12 who were attacked on the first two days, 4 were from boats' crews, and 8 were not. In all 26 took the disease, of whom 11 belonged to boats, and of these 5 died; while of the fifteen others, no fewer than 13 died. As 84 people of the ship's company, which amounted altogether to 217, belonged to

boats, 11 will represent pretty nearly the corresponding ratio of the numbers attacked."

From the *Leander*, sailing-frigate, with a crew of 500, the answer is that the first four cases of cholera occurred in men employed on shore at Old Fort Bay, bringing on board flour captured from the enemy; about 60 men were occupied thus on the 19th and 20th of September (the first case occurred on the latter day). The subsequent cases did not fall more on those thus employed than on others remaining on board.

In the *Vesuvius*, steam-sloop, the boats' crews communicating with the shore suffered more, and were nearly the first attacked; while in the *Rodney*, a screw second-rate, the boats' crews are stated to have suffered less and not at an earlier period than the rest of the ship's company.

In the *Terrible*, paddle-wheel steam-frigate, only one case of Asiatic cholera occurred amongst the boats' crews who were in daily communication with the shore at Varna, Baltschik, and the coast of the Crimea, also with the transports, especially those which conveyed horses. In these cholera had prevailed to a great degree during the time they were at anchor off Baltschik and Varna. The man who was attacked was taken ill on the 19th of September, and was the first case in the ship. The previous day he had been employed in landing horses at Loukoul. The second case of cholera occurred on the 22nd of September, in a delicate lad who had been suffering from bilious diarrhœa for two days, but had concealed it. He fell rapidly into a state of collapse, from which he was with difficulty extricated; consecutive fever set in on the 25th, which terminated fatally on the 30th. He had had no communication with the shore for many months.

The answer from the *Sans Pareil*, third-rate, is that nearly all the ship's company formed part of the different working parties on shore, so that no conclusion could be come to.

From the *Retribution*, steam-frigate, we have the answer that, from the number of seamen during this period on the sick list, suffering from diarrhœa, and who were attached to the different boats of the ship, it is probable, that these men did suffer more than those who were confined on board, that is from diarrhœa and choleraic diarrhœa.

With respect to the *Bellerophon*, constant intercourse with the shore was kept up by all on board, so that no inference could be drawn.

The answer from the *Vengeance*, first-class second-rate, is,

that out of 18 seamen attacked, 4 only belonged to boats, and that these were not the first cases.

It thus appears that in seven ships those having communication with the shore were first affected, the notion being in so far favoured, that the disease was caught by contagion; while in fourteen cases the disease did not appear first in those who were in communication with the shore, and in two cases there was no evidence either on the one side or the other.

The following are answers to the question as to *the numbers of cases (if any) without promonitory symptoms.*

Sidon.—One case without premonitory symptoms, the other ten with premonitory symptoms, lasting from 12 to 48 hours.

Banshee.—None without. Only one man attacked, who had smart diarrhœa for 8 hours.

London.—None without. Duration of premonitory symptoms, a few hours to 3 days.

Firebrand.—In the two cases, the one for 8 hours, the other for 2 or 3 days.

Vulcan.—None without. Diarrhœa for about 12 hours.

Niger.—All three had diarrhœa from 1 to 3 days.

Highflyer.—None without. In the only two cases the one was purged 9 hours.

Agamemnon.—None without. Premonitory symptoms from 2 to 6 hours.

Queen.—One uncertain. Premonitory symptoms about 2 days.

Cyclops.—Without premonitory symptoms two; with premonitory symptoms three; which lasted 3 hours.

Megæra.—One without premonitory symptoms, two with; lasted 2 days.

Wasp.—None without.

Furious.—Twenty-six attacked. Cannot tell, not being with the ship.

Leander.—None without. Thirty-eight cases. Premonitory symptoms 2 or 3 days. Diarrhœa in the ship more or less for 3 weeks.

Vesuvius.—Without premonitory symptoms, one seaman; in the rest the premonitory symptoms lasted about 24 hours.

Rodney.—None without. All had premonitory symptoms from 2 or 3 days to 12 hours.

Terrible.—One case without. One with bilious diarrhœa for 2 days.

Sanspareil.—Uncertain evidence.

Retribution.—Two or three cases without premonitory symptoms; where existing they lasted from a few hours to a day.

Trafalgar.—Doubtful whether any were without premonitory symptoms.

Albion.—In eight cases out of ninety-seven, no premonitory symptoms.

Bellerophon.—Three cases out of eighteen occurred without diarrhœa; duration of premonitory symptoms, 6 hours to a week.

Britannia.—No premonitory symptoms in half the cases.

Vengeance.—Three out of twenty-nine without; where there were premonitory symptoms, they lasted from 2 to 3 days.

It thus appears that out of 711, which was the number of attacks of cholera in the whole Black Sea fleet from which returns were received, there were, without premonitory symptoms in the—*Sidon*, 1; *Cyclops*, 2; *Megæra*, 1; *Vesuvius*, 1; *Terrible*, 1; *Retribution*, 3; *Albion*, 8; *Bellerophon*, 3; *Britannia*, 114; in all 134 cases, or more than one in six.

In the *Britannia*, where there were altogether 229 persons attacked, the answer, probably from the surgeon, Mr. Rees, is thus given: "Not able to state with accuracy, but would give as my opinion, that one half at least had no premonitory symptoms whatever."

We now come to the opinions of the medical officers on *the chief predisposing and exciting causes of the outbreak of cholera in the fleet, the comparative suffering of each ship,* and *the treatment and suggestions as to preventive measures.*

The medical officer of the *Sidon*, Mr. Dalton, considers that some peculiar and subtle poison in the atmosphere was the exciting cause. The excessively sultry and oppressive weather with the thermometer between 80 and 84, and the barometer between 29·93 and 30·34, was, in his opinion, the predisposing cause. The *Sidon's* comparative immunity may have arisen from her not having remained so long as other ships at anchor at Baltschik and Varna, where the cholera raged, and from her having put to sea for three or four days after the first case occurred. The treatment at the commencement was half a drachm of calomel, or calomel and rhubarb; subsequently two grains of calomel and a quarter of a grain of opium, every two hours, with stimulants. In collapse, warm baths, turpentine epithems, mustard poultice to the stomach, hot bricks to the extremities, and friction and heated sand-bags

between the thighs were employed. To allay vomiting, chloroform was given in ten-drop doses. During convalescence, tonics and stimulant beverages were used. As preventive measures, Mr. Dalton suggests—ventilation, cleanliness, chloride of zinc as a disinfectant, recreation and amusement among the men, with generous diet and fresh provisions. He also recommends quinine as a preventive, and observes that the officers, living better, were more exempt than the men, and concludes, therefore, that an impoverished state of blood predisposes to the complaint.

The medical officer of the *Banshee*, Mr. Ross, considers that there were no discoverable predisposing or exciting causes; and he offers no observations as to the comparative immunity in that vessel. In the only fatal case that occurred, acetate of lead and opium in large doses, and other powerful astringents, scruple doses of calomel, and blisters, and stimulants, were all used without effect. He suggests as preventives — thorough ventilation, avoidance of damp, generous living, abstinence from green and unripe fruits, and a careful attention to the state of the bowels.

Dr. Douglas, of the *London*, is unable to say anything about predisposing or exciting causes. He thinks it possible that the ship suffered but slightly, from having been kept clean, dry, and well ventilated. The crew having been guarded as much as possible from the heat of the sun, and the ship having put to sea early. The diarrhœa was treated with strong astringents and opium; the cramps and vomiting with large doses of camphor, calomel, and opium, sinapisms to the epigastrium, and stimulating frictions to the extremities. He recommends as preventive measures—avoidance of communication with infected places and ships, cleanliness, ventilation, and dryness of decks, good food, warm clothing, avoidance of excesses, and of exposure to night air, wet, and hot sun.

In the *Firebrand*, of two fatal cases that occurred, one was exposed to predisposing causes on shore. The comparative immunity is attributed, by Dr. O'Hagan, to the frequent shifting of the ship's place, the full occupation of the crew, and the strict adoption of precautionary measures and cleanliness. One case was treated with sulphuric acid, the other with ether, opium, brandy, warm bath, and warm frictions: both died. The doctor suggests, as cholera rarely appears without premonitory diarrhœa, the establishment of a strict police to watch the food introduced, to enforce cleanliness and ventilation, and to report all cases of diarrhœa.

In the *Vulcan* there was only one case. The man drank a quantity of cider, and neglected the premonitory symptoms. The treatment consisted in a full dose of calomel, followed by smaller doses of calomel every two hours, and external frictions; but collapse came on and death ensued. Mr. Peters thinks that the usual measures adopted in well regulated ships to keep men in health are likely to be beneficial, viz.: to cleanse the bottoms of the ships, to avoid exposing the men early in the morning without food, to enjoin the free use of flannel, and to feed the crew on fresh meat if procurable.

In the *Niger*, the three men attacked, of whom two died, all belonged to a party of fifty employed from September 21 to 26, in bringing down wounded men and cholera cases from the Alma. The treatment pursued was calomel in large doses, opium, mustard sinapisms, stimulating liniments, hot baths, friction, and brandy.

In the *Highflyer*, there were no fatal cases; the predisposing causes, enumerated by Dr. Kerr, are—fatigue, exposure to the sun by day, and cold at night. The immunity of the ship is attributed to her having remained but two days at Baltschik, and then having gone to Constantinople, which was healthy; also to a good ventilation of the decks. The treatment adopted was, by opiates, astringents, and stimulants, external heat, counter-irritants, and frictions. Dr. Kerr considers the avoidance of exposure to fatigue in the sun, and to sudden chill afterwards, as also the use of proper diet, to be powerful means of warding off the disease.

In the *Agamemnon*, there were 27 attacks, and 22 deaths. Dr. Mackay considers the predisposing causes to have been intemperance and a relaxed state of bowels; the exciting causes a peculiar poison in the atmosphere rendered contagious by the evacuations from the Nile, and foul or confined air in badly ventilated spaces between decks, or in the hold. He remarks that those only were seized who worked in transports, which had either suffered from cholera or were very dirty and foul. The prophylactic measures adopted were the giving drachm doses of quinine wine to watering parties and to those who had been at work in suspected ships, and the use of chloride of zinc in the sick bay and patients' bedding. The remedies adopted in the epidemic diarrhœa were chalk mixture with tincture of catechu, and of opium, and acetate of lead with opium. In cholera, as well in the first stage as in collapse, calomel and opium were exhibited either in large or in frequently repeated doses. Carbonate

of ammonia was tried, and also castor oil. No remedy had any decided effect. Oft repeated two-grain doses of calomel were considered the most successful means, and these were occasionally combined with opium, while chloroform, sulphuric ether and other diffusible stimulants were used according to circumstances, and frictions, hot bottles, etc., were employed externally to relieve cramp and restore heat. The prophylactic measures suggested, are—all possible ventilation, the free use of chloride of zinc, and a change of the locality by proceeding to sea for a cruise. The administration of quinine wine to those going on board suspected ships or on watering duties to the shore is recommended.

In the *Queen*, the six persons attacked, all died; and there were also three who died of diarrhœa. No suggestions are offered respecting either predisposing or exciting causes. The treatment was by stimulants, opiates, turpentine frictions, carminatives, and hot water tins to the stomach. In the diarrhœa, acetate of lead and opium, chalk mixture, and other astringents, were given. The prophylaxis recommended is—to attend early to the diarrhœa by the use of mild astringents, and afterwards to exhibit compound tincture of rhubarb with laudanum.

In the *Cyclops*, there were five attacked, of whom two died. Mr. F. Williams considers the predisposing cause to be a general cachectic state of constitution. The slight visitation of his vessel he attributes to free ventilation and cleanliness. His treatment in those that recovered was, saline, as recommended by Dr. Stevens, with hot sand and hot blankets externally; large doses of calomel were added to the saline treatment in those who died. His recommendations with regard to prophylaxis, are—free ventilation and cleanliness, combined with dryness, and the use of chloride of zinc.

In the *Megæra*, Dr. Fisher reports that three were attacked and two died. In his opinion, the ordinary predisposing causes of all epidemic diseases are also those of cholera. He attributes the nearly absolute immunity of his ship to the abundance of space and the free ventilation. As to treatment, he only states generally, that it was stimulating internally and externally. His prophylaxis is the immediate treatment of diarrhœa, however slight, and a sedulous attention to cleanliness and ventilation.

In the *Wasp*, there were five attacked, of whom two died. Mr. Walling considers the predisposing causes to have been exposure to wet, cold, and wind, with bad food and clothing. In his opinion all lowering causes predispose to the disease.

With reference to the exciting cause, he remarks, that all the cases occurred among those who served with the naval brigade. His treatment was to diminish the quantity of fluids taken, to apply hot water externally, at the same time preventing its evaporation, and to exhibit internally calomel and camphor, in doses of two grains each, every hour, having previously given a large dose of calomel and opium. His prophylaxis is—good clothing and feeding, with comforts, a clean ship and change of place.

In the *Furious*, 26 were attacked and 18 died. Dr. Fulton having been taken ill, Dr. Alexander Walton took charge of the ship, but not till six days after the last case occurred. He could not therefore give any account of either the causes or the treatment of the cases. The prophylactic measures, recommended by him, are cleanliness, dryness, and ventilation of the ship, with good clothing for the men, the avoidance of long fasts and fatigue, and immediate attention to all cases of diarrhœa.

In the *Leander*, there were 38 attacked, of whom 21 died. The only cause, according to Mr. Nolloth, the surgeon, was atmospheric influence. His treatment seems to have been solely external; at least, he only mentions heat and friction, mustard poultices, and turpentine epithems. In choleraic diarrhœa, he found most benefit from turpentine and tincture of opium, but states that dilute sulphuric acid was also much employed. He has nothing to recommend as prophylactic beyond general hygienic measures, and especially dryness of the ship.

In the *Vesuvius*, there were three persons attacked, of whom one died. Mr. Patterson considers the disease to have been excited by some atmospheric morbific cause; while as predisposing causes, he mentions the immoderate use of fruit, and exposure to heat. His treatment was to give a dose of from ten to fifteen grains of calomel, followed by two-grain doses every two or three hours, sometimes with small doses of opium, hot flannels with oil of turpentine to be applied to the epigastrium, and friction to be employed for cramps. As prophylactic measures, he recommends that the use of salt provisions should be suspended, and fresh meat with vegetables in moderation substituted; that fruit should be avoided, and that strict attention should be paid to cleanliness, dryness and ventilation. He likewise enjoins change of place on the outbreak of cholera.

In the *Rodney*, of 26 attacked, 8 died. Dr. Kinnear considers the exciting cause to have been atmospherical, the pre-

disposing cause, bad food, giving rise to diarrhœa. His treatment was astringent mixtures with lead and opium for diarrhœa. In collapse, friction and warmth, and all means calculated to restore circulation. He states that creasote, hydrocyanic acid, and saline treatment were all tried with doubtful effect. In the way of prophylaxis, nothing was done beyond the adoption of the usual hygienic measures; no vegetables, cheese, or irritating articles of food ought to be allowed, and diarrhœa should be treated immediately.

In the *Terrible*, there were three attacked, of whom one died. Mr. Banks considers the exciting cause to have been atmospherical. On the 14th of August, when the first case of choleraic diarrhœa occurred, he states that a hot blast came off from the hills about Baltschik, and continued to blow nearly half an hour, after which the air became many degrees cooler. It passed over the war steamers *Terrible* and *Fury* and over a fleet of 42 transports, all at anchor. Several rapidly fatal cases of cholera occurred in the transports, in which the drainage from the horses had made its way through the shingle to the hold, so that these vessels could not be purified. Previous to their arrival from the Bosphorus nearly all their crews had suffered from diarrhœa, dysentery and typhoid fever, which predisposed them to attacks of cholera. The town of Baltschik was healthy; but just over the anchorage, eight thousand French troops, who had lately returned from the Dobrudscha, and had suffered severely from cholera, were encamped. That the ship's company in the *Terrible*, among whom bilious diarrhœa had been almost universal, suffered so slightly from cholera, is ascribed by Mr. Banks to the excellent state of the men's health, and their regular habits; to the ship having been constantly on the move, and to the crews having had no communication with places on shore where they could commit excesses. They were thus better able from constitution to resist the choleraic poison. The same immunity from cholera was enjoyed by this ship when last in commission, in August and September, 1850. Cholera then was raging at Malta, and in the squadron which had arrived in July from Salamis Bay. The crews of other ships were allowed to visit the shore, where the usual excesses were indulged in. The crew of this ship had not been on shore for more than six months, and were in robust health, and able to resist cholera although they suffered from diarrhœa. The treatment found successful in diarrhœa with coldness of abdomen and flatulence, was as follows: tincture of opium, spirits of turpentine, of each thirty

drops; spirit of camphor, ten drops; peppermint water one and a half ounce. Seldom more than two doses were required. The patient was kept in bed, and sinapisms were applied over the abdomen in the event of his suffering from tormina. Arrow root and brandy were employed for sustenance. In decided cholera, calomel and opium freely given did good with some, bringing the patient out of collapse, but with a sequela of fever; with others, these remedies did no good. Under a rapid loss of vital power the stimulating plan both internally and externally is recommended. As prophylactic suggestions—the mess deck is to be kept as dry as possible; when it is washed, hot water should be used, and the men not allowed to go on it till it is quite dry. When the men are turned out early, they should have a ration of tea or coffee before going on deck, in addition to their breakfasts, for diarrhœa has appeared more frequently between four and seven A.M., than at any other time. Provisions should be thoroughly cooked; some men are stated to prefer salt pork unboiled, but that should be forbidden; all fruit brought on board should be examined, and that which is unripe or decayed rejected; above all, the men should be enjoined to apply for medical aid on the least appearance of bowel complaint.

In the *Sans Pareil*, there were 25 attacked, of whom died 12. Dr. Donovan is not aware of any exciting cause except the prevalence of cholera at Varna and among the transports. The different ships suffered differently at the same anchorage without any apparent cause, if the internal management of the ship and cleanliness be excepted. Dr. Donovan's treatment was by heat and friction externally, and by stimulants of all kinds internally. Dilute sulphuric acid was also employed to allay sickness and diarrhœa, as also calomel in small doses; but when the collapse was sudden or occurred early, nothing seemed to avail. The only prophylactic in his opinion is, to keep the body in the best state of health.

In the *Retribution*, 2 were attacked, and both died. The predisposing causes, according to Mr. Slight's opinion, were high temperature, drinking cold water when hot, exposure to cold damp air, and the excessive use of fruits and vegetables. He offers no remarks on the exciting cause. In the treatment, calomel, confection of opium, and quinine, with all means for stimulating the circulation and bringing about reaction, were employed in the cholera cases. The prophylactic measures recommended are—ventilation, cleanliness, the prohibition of fruits, green vegetables, and cold water; pro-

tection of the body by flannel, avoidance of high temperature by day and cold at night, fumigation of the hold, whitewashing and the free employment of chloride of lime; also the immediate treatment of premonitory symptoms.

In the *Trafalgar*, 125 men were attacked, and 40 died. Mr. Morgan could not trace out any predisposing cause. The finest men were attacked, and the weak were spared.

The only exciting cause which Mr. Morgan could surmise was the use of water from Baltschik, which was impure in consequence of having been used for washing linen, etc., by Bosquet's light division, just returned from the Dobrutscha. The fact that this ship had fewer deaths, in proportion to the attacks, than others, Mr. Morgan attributes to her having quitted the station and got further from land than any other ship; to the allowing a full circulation of air, to the cleansing by chloride of zinc; to the use of quinine wine to every man each morning; and to the wearing of warm clothing. Of the treatment, which was various, the most efficacious was Dr. Billing's, *i. e.*, two grains of tartarised antimony, and half an ounce of sulphate of magnesia, in half-a-pint of water; of which mixture a table spoonful was taken every half hour. The prophylaxis recommended is—free ventilation, cleansing the ship with chloride of zinc, and keeping the decks dry by swinging stoves.

In the *Albion* there were 97 cases of attack, of which 68 died. Mr. Mason observes that he is unable to assign any cause for the sudden and almost simultaneous outbreak of the disease in so many ships of the squadron. There was no peculiarity observable in the condition of the atmosphere prior to the outbreak, but the disease had been prevailing for three weeks within twenty miles of the ship. All the cases were treated upon the same plan, which was to give a scruple of calomel, with a grain and a half of opium, at the commencement, and to continue the calomel in ten grain doses every hour until the rice water discharges ceased, and the alvine evacuations assumed a feculent character; frictions, the application of hot water, and, in several cases, stimulants, were used without, however, it appearing that they were of any benefit. Mr. Mason thinks that when cholera is known to prevail in the neighbourhood of the port where a ship is lying, it is desirable that the ship should put to sea, and that the distance she proceeds should be such as to give a reasonable hope of her getting clear of the epidemic influence. The men should have warm clothing, good fresh meat and vegetables, and an ounce of quinine wine each before breakfast.

In the *Bellerophon*, there were attacked 16, of whom 8 died. Dr. Mackay considers the exciting cause to have been an epidemic influence, to which the men were predisposed from having been hard worked and exposed to much vicissitude of weather. Fruits were prohibited. The men-of-war at Varna suffered less than those at Baltschik, but for no apparent reason. The treatment was by stimulants of ether, ammonia, and opium; champagne and brandy and water, or ale, for drink, with frictions, hot fomentations, and sinapisms. Calomel was also given in one or two cases in large doses. By these means the purging and vomiting were arrested; but in some a comatose state supervened, from which none recovered. Dr. Mackay's suggestions as to prophylaxis are cleanliness, ventilation, and dryness of decks and clothing, the prohibition of unripe fruit, and a prompt attention to diarrhœa. He remarks that non-communication appears to possess no influence.

In the *Britannia* there were attacked 229, of whom died 139. The crew were in a high state of health when the disease broke out, so that Mr. Rees cannot assign any exciting or predisposing cause for its advent. The great outbreak, however, he thinks, was probably caused in a great degree by the closing of the deck ports on the previous night, on account of the boisterous state of the weather. The treatment was various: sulphuric acid, calomel and opium in large doses, calomel, lead, and opium, chloroform, creasote, various stimulants internal and external, etc. All means signally failed during the advance and at the climax of the disease, but during its decline medicines acted beneficially; and then a combination of lead, opium, and calomel was of most use. The prophylaxis recommended is the keeping the men in a high state of health, and putting to sea in favourable weather. This measure proved useful in the majority of cases, and its want of success in the *Britannia* was owing to the misfortune of being obliged, from the weather, to close the ports when the disease was at its height.

In the *Vengeance* there were attacked 29, of whom died 17. The predisposing cause, according to Dr. Graham, was heat of weather; the exciting cause atmospheric influence. This ship suffered moderately. The treatment consisted in the application of external warmth, and the internal administration of calomel and opium, but not to a great extent; stimulants were also used, but no special mode of treatment is recommended. The prophylaxis suggested is—dryness, cleanliness and ventilation, good food, and the removal of the ship from a diseased locality.

The *Inflexible*, paddle-wheel steam sloop, with a crew, including all hands, of 195, had no cholera, although she was at Constantinople, Baltschik, Varna, and cruising with the fleet in August and September 1854, when cholera prevailed. Diarrhœa was however very prevalent; how many cases occurred is not stated. It was successfully treated in all by the lead and opium pill of the Edinburgh Pharmacopœia, given every half-hour or hour until the disease was checked, means being adopted to prevent the men from eating unripe fruit and other injurious articles of diet. The surgeon of this ship, Mr. John Watt Reid, treated cases of cholera from the *Britannia*, on board the *Apollo*, in August 1854, in the following manner :—Lead and opium pills after each motion, or alternately with chalk mixture. Chloroform, from ten to twenty-five minims, was given, not in extreme collapse, but in some cases where the cramps were severe, the vomiting urgent, and hiccup troublesome. When kept down, as it frequently was, it generally seemed to give relief, and certainly did so in a number of instances. Frictions and heat were used for cramps, sinapisms to the epigastrium for hiccup, and also effervescing draughts. In extreme cases, brandy and wine were given. The immunity of the *Inflexible* from cholera is attributed to the care that was taken of the men on duty, the early application of treatment to diarrhœa, and the means adopted to prevent the use of unripe fruit and injurious articles of diet. No suggestions are offered regarding prophylaxis.

The *Triton* war steam vessel, with a crew of, all hands, 65, had no cholera on board, but 20 cases of diarrhœa, none of which proved fatal. The ship was at Varna when the first case occurred, and during the continuance of diarrhœa was at Baltschik and Varna, or at sea with the fleet. On the whole they had neither frequent nor intimate communication with the shore, with shore boats, or with other vessels of the squadron. The average duration of the diarrhœa cases was seven days. The first case occurred on the 5th of August. As for predisposing causes of diarrhœa, there were none recognised by Mr. Forbes. The crew was in good health, and there was no change in their habits, duties, or diet, to account for the outbreak. With regard to the state of the atmosphere, the days were hot and sultry, and the night air remarkably moist and chilly. The milder cases were treated with chalk mixture and opiate confection. Those with vomiting and occasional cramps had, with good effect, pills of five grains of calomel and a grain of opium, repeated according to circumstances; and when purging continued, after the

cessation of pain, pills of five grains of acetate of lead and half a grain of opium were given three or four times a day, according to the urgency of symptoms.

The *Spitfire*, with a crew of, all hands, 65, a third class steam surveying vessel, had no cholera, although communication with the shore at Varna and Baltschik was uninterrupted. She had diarrhœa, however, during the months of July, August and September 1854, and the boats' crews suffered most, from the fruit and other things which they, more than the rest of the ship's company, had the opportunity of indulging in on shore. There were 38 cases of diarrhœa in all placed on the sick list, and the symptoms did not differ from those ordinarily observed. The exciting cause seemed to be some peculiar atmospheric agency. The predisposing causes were exposure to wet and night air, and errors in diet, especially in eating unripe fruit. The escape of the ship from cholera is attributed by Mr. Wilcox to its frequent change of position, so as not to have remained long in the same current of air; and to the facility in a small vessel of observing the state of men's health, their mode of living, and the first appearance or indication of the disease. The diarrhœa is stated to have yielded to ordinary remedies; and the only prophylactic suggestions recommended are, besides cleanliness and ventilation, a strict observance of the crew that they may obtain medical treatment on the first appearance of symptoms.

The *Spiteful* steam sloop, with 135 of all ranks on board, was free from cholera; yet she used the same water, obtained from Eupatoria, as the *Leander*, and was for a week in October and three weeks in November, 1854, lying close to her, during which periods she was suffering severely from cholera. Why the one ship suffered while the other escaped is not considered explicable by Dr. Clarke: and there are no special suggestions recommended by him for the prevention of the disease, beyond cleanliness, a strict surveillance over the shore boats, so that they may not be the means of introducing into the ship unwholesome food or unripe fruits, the use of flannel belts round the abdomen; and lastly, a sufficient supply of clean bedding—a point often altogether overlooked on board ship.

The *Beagle* steam gun vessel, with 65 souls on board, was never attacked with cholera or choleraic diarrhœa. She used distilled water, but her immunity is attributed to her late arrival in the Black Sea, when the cholera had all but ceased, and to her being continually on the move.

The *Arrow,* a despatch gun boat, with 65 souls on board, was never attacked. She used distilled water, and Mr. Govett, her surgeon, makes it a question whether to this cause is to be attributed her immunity. He suggests as preventives, in addition to cleanliness and dryness, the free use of chloride of zinc, the closing the scuttles and ports at night as much as possible, and the use of distilled water.

The *Caradoc* steam vessel, with 65 souls on board, had no case of cholera. No remarks whatever are offered by Mr. Charles McShane, her medical officer.

The *Apollo* store ship had 90 souls on board. She was not attacked with cholera, although lying in Baltschik Bay, where the disease was raging between the 11th and the 29th of August 1854. Inferior bread was daily brought by a boat from Baltschik; but the fruit, not being ripe, was not allowed to enter the ship. The water in use was obtained at Malta. Several of the merchant ships lying close to the *Apollo* suffered; and, moreover, she received the men of the *Britannia,* who had been attacked at sea, amounting in number to 89; 26 of whom died. The ship's company occupied the lower deck, while the sick men from the *Britannia* were on board. It seems very extraordinary that this ship should have escaped. Both contagionists and non-contagionists would find abundant reason why she should have been attacked.

The *Fury* steam ship had 160 souls aboard. She was not attacked by cholera. Her water was partly obtained from the rivulet at Baltschik, and partly from condensed steam. Dr. Stirling, the surgeon, can offer no opinion as to the cause of immunity; for the vessel was surrounded by ships that were attacked, communication with which, as well as with the shore, was freely permitted and actually took place; and the crew devoured unripe plums, pears, apples, etc. without any stint. There were, however, no means of getting spirits.

The *Lynx* steam vessel, the number of whose crew is not stated, had no cholera; and her surgeon, Mr. Johnstone, offers no remarks whatever.

The *Modeste* sloop had 141 souls on board. She has had no cholera since she has been in commission. She was employed fourteen months on the Ionian station, during which time she had a free allowance of fresh provisions, obtained chiefly from Corfu. There was no cholera in the Ionian Islands. No special suggestions are offered by Dr. Mitchell with regard to preventive means.

The *Viper* screw steam gun vessel had 65 souls on board. She did not suffer from cholera, and no remarks in elucidation of this fact are offered by Mr. Haran.

The following are the Baltic ships which had cholera :—

The *Wrangler*, a steam gun vessel, with 65 souls on board, had an assistant surgeon, Mr. W. E. O'Brien. He answers the question respecting the comparative suffering of boats' crews in the negative, and had no cases without premonitory symptoms. He had only two cases of cholera; of these one occurred at Woolwich, on board the hulk, on the 3rd of August, 1854, and the other on board the *Wrangler*, which took place on the 1st of September. The habits, occupation, and manner of living of the ship's crew are stated to have been so opposite in those attacked, that no opinion could be formed as to the predisposing causes; but the exciting cause which appeared most common was sudden change of temperature. The almost complete immunity of this ship from cholera is attributed to her having arrived in the Aland Sea after the disease had nearly subsided in the fleet. The whole of the ship's company, however, had diarrhœa of some kind previously; and there was no instance of a second attack. The treatment of this diarrhœa was by sedatives, antacids, and astringents. Where symptoms of collapse set in, calomel and morphia, given every hour, with sinapisms to the epigastrium, were found the most effectual remedies; and a large number of cupping glasses applied over the limbs and body, and frequently moved, are stated to have had a good effect in restoring warmth and preventing cramp. The chief suggestion as to prophylactic measures is that the bilges be kept clean. In screw steamers much tallow and oil drop into the bilge, and together with refuse matter form a solid mass on the surface of the wood, which is impervious to chloride of zinc. It is therefore recommended to line the bilges with metal, and having let the water from the boilers with caustic alkali in it run into them, to pump them out before using the chloride of zinc.

The *Hannibal*, a second class screw line-of-battle-ship, with a ship's company of 620 men, together with 977 French troops, was attacked with cholera in lat. 56 N. and long. 5·43 E., two days after arrival at Ledsund, near Bomarsund. She had 38 seamen and 8 marines attacked with malignant cholera, but no officers, while there were 232 cases of choleraic diarrhœa, and among them nearly all the officers. These cases were exclusive of those which occurred among the French troops, of whom many had the same affection.

Fifteen seamen and one marine died of cholera; but of these, two cases were relapses during perfect convalescence, brought on from irregularity in diet, and five of them died of secondary fever. There was, however, no death among those affected with choleraic diarrhœa. Of the French soldiers, two died on board; but about 40 died the day after landing. About six or eight of the cholera cases were without premonitory symptoms; but where these existed, their average duration was between twenty-four and forty-eight hours, though in some cases not more than six hours. The first case of choleraic diarrhœa occurred on the 19th of July 1854, and of cholera on the 1st of August 1854. It was that of a French soldier; and the following day one of the ship's company was attacked, and died in a few hours. The predisposing and exciting causes of the disease were as follows:—Too crowded a state of the ship (upwards of 1,500 individuals being on board); insufficient ventilation, arising from the fittings necessary for the troops and the necessity of shutting the lower deck ports at night; change of diet and mode of living, nearly every one on board having been unaccustomed to a sea life; insufficient clothing; and the use of the water distilled on board, which was at first mixed with salt water, in consequence of the same hose having been employed for pumping both kinds of water. From these causes, and perhaps also because the crew consisted of very young and unseasoned men, the *Hannibal* suffered more than any other vessel in the Baltic, except some of the French line-of-battle ships. From information derived from the Russian officers, prisoners of war, it appeared that no case of cholera had ever occurred in the Aland Islands previously to the landing of the French troops. The treatment of the cholera cases was, externally, heat and stimulating frictions to the surface and mustard plasters to the epigastrium and legs; internally, a scruple of calomel with half a grain of opium immediately, followed by two grains of calomel every hour afterwards until mercurial fœtor was observable; drachm doses of spirit of nitric ether occasionally; effervescing draughts of carbonate of soda and citric acid every five or ten minutes; cold water, tea, and lime juice, as much as the patient chose. The calomel and the friction allayed the cramps almost instantaneously, and the effervescing draughts were found the most efficacious means and the most agreeable for relieving sickness. Dr. Crawford considers opium and brandy worse than useless. Under the above treatment 16 cases only out of 46 of true blue Asiatic cholera, all in complete collapse, died. No case of cholera

occurred on board the *Hannibal,* between the 14th and 19th of August. On the latter day about 350 Russian prisoners came on board, for a passage to England, from an infected French steamer. Two of them were immediately seized with cholera. Diarrhœa was also prevalent among them; it was attributed to their having drunk salt water on board the steamer, not being able to procure fresh. Between the 19th of August and the 1st of September, 50 of them had malignant cholera, and 19 died, two of typhoid pneumonia after recovery from cholera, and six of secondary fever. The treatment was the same as that already stated. Several of the Russians who died were between 45 and 50 years of age; some were pensioners and several were convicts. Dr. Crawford states that he gave these men as much vinegar and water as they chose to drink, as they were accustomed to sour diet; and he is inclined to think that such a beverage would be beneficial in all cases of cholera. Acetic acid he considers to be, when combined with opium, a powerful remedy in diarrhœa.

Very few persons in the ship escaped diarrhœa; 232 were placed on the sick list as the most severe cases, and were certainly as truly *cholera* as most of the cases returned under that head in Hospital Reports. Very many besides were treated without being put upon the sick list. The French did not suffer so generally from diarrhœa as the English, which may perhaps be explained by their better clothing, by their having no fatigue to undergo, no exposure to the weather or night air, and to their not drinking so much water as our men who had much work to do. The diarrhœa was treated at first with large doses of calomel, afterwards with two grains of calomel and half a grain of opium every two hours, together with chalk mixture, tinctures of opium and of catechu, and other astringents. Of all remedies, the most effectual was calomel and opium with chalk mixture. Not a single case died of this disease. Dr. Crawford suggests, that during the prevalence of cholera, the men should not be overworked, they should be allowed a fair quantity of sleep, and not be obliged to leave their beds too early in the morning; that they should not be exposed unnecessarily to wet or cold or night air; that they should have their meals at regular hours, and be allowed sufficient time for them; that their clothing should be warm, and their bedding aired occasionally. With regard to the ship itself, it should be well ventilated, the decks kept clean and dry, and the hold frequently washed with chloride of

zinc. All depressing influences should be avoided, and amusements, as dancing and singing, encouraged.

The *Algiers,* second-rate screw steam ship, had a crew, taken altogether, of 646 men, and in addition to these 460 Russian prisoners. None of the boats' crews was attacked with cholera, and only one case occurred among the ship's company, which case did not prove fatal. One Russian prisoner was attacked and died, and he had no premonitory symptoms. The first case occurred on the 20th of August, 1854. The disease was raging epidemically among the French men-of-war when the *Algiers* arrived at Ledsund. Among the English ships it was on the wane, only a case or two appearing now and then. The first case appeared on the day on which the Russian prisoners were received; one of these was attacked during the night and died the next day. These prisoners came from a French hospital-ship, in which the disease was very rife. After this, diarrhœa of a choleraic character appeared among the prisoners, and then among the ship's company, and on the 29th a case of cholera occurred. There was nothing peculiar in the atmosphere or in the condition of the ship, but it was not until the Russians were received that there were any indications of stomach or bowel complaints. During the passage, while in the Great Belt, the ship came into juxtaposition with the *St. Vincent,* in which vessel the disease was rife and on the increase on that day; on that day, too, there was an increase of diarrhœa in the *Algiers,* which was towing the *St. Vincent.* On the following day she was cast off, and the ships separated, when the diarrhœa immediately decreased. It should be observed, however, that at the same time a gale of wind from the southward set in, after which all diarrhœa subsided. The chief predisposing and exciting causes of the disease seemed to be exposure and fatigue, with irregularity and sudden change of diet. That the ship suffered so little might be attributed to the superior character of the crew, who were seasoned sailors, and had orderly and cleanly habits. The only remedies used were at first, opium two grains and calomel ten grains, and these means were repeated in diminished doses. Externally, hot water in tins was applied to the scrobiculus cordis, spine, and extremities; and to allay cramps, strong friction was applied. The preventive measures recommended by Mr. Andrews are, that the ship should be kept as dry and clean and as well ventilated as possible; that all offensive odours emanating from the holds, bilges, pumpwell, etc., should be destroyed by a plentiful distribution of

the chloride of zinc; that the men should be kept personally clean, that their hammocks and bedding should be frequently exposed to the sun and air, that they should not be needlessly exposed or harassed with excessive exercises, that their comforts should be attended to, and contentment and cheerfulness created and fostered; that only wholesome fruits and vegetables and in fresh condition should be allowed on board; that all deviations from health, especially diarrhœa, should be promptly attended to and treated; that the leading men should be made aware of the necessity of watching the rest and reporting their state to the medical officer; and, lastly, that no man coming from a choleraic ship or locality should be placed on board a clean ship.

It only remains that we should give a summary of the preceding observations.

First, the question with regard to *predisposing causes* is answered by the medical men of fifteen ships only, and their opinions may all be enumerated as follows:—exposure to sudden changes of heat, cold, moisture, and night air, bad food and clothing; intemperance; immoderate use of fruits and vegetables; drinking cold water, when hot; hard work, causing fatigue; crowding; bad ventilation; the use of impure water; finally, diarrhœa as a consequence of the foregoing causes, either singly or in combination.

With respect to the *exciting cause*, the question is answered by the medical men of sixteen ships only; of these, ten consider it to have been atmospheric influence; one considers the poison to have been atmospheric, but rendered contagious by evacuations from the sick, and by foul air; while the remaining five, without mentioning the term, evidently lean to the side of contagion.

The question regarding the *cause of comparative immunity* received answers from the medical men of sixteen ships, and may be thus comprised. The immunity is ascribed to shifting of locality; to cleanliness, dryness, and thorough ventilation of the ship; to keeping the men out of the sun and fully occupying them; in one case to the excellent health and regular habits of the men and their non-communication with the shore; to the free use of chloride of zinc; to the use of quinine wine as a preventive; to the avoidance of unripe fruit; and to the early treatment of diarrhœa. In one case it is made a query whether the use of distilled water may not have prevented the occurrence of the disease.

On the subject of *treatment*, we have answers from all those ships which were visited by either cholera or diarrhœa, but there were twelve which escaped altogether. It seems to have been a very frequent practice to commence with a large dose of calomel and opium, and then to give small doses at frequent intervals. In at least eighteen of the ships calomel seems to have been the leading medicine. Stimulants, both internal and external, were also much used. Dr. Billing's plan by tartar emetic is extolled by one gentleman, and Dr. Stevens's saline plan by another; but no such measure of success seems to have followed any mode of treatment as to recommend it emphatically beyond the rest. The only novelty that we call to mind is the application of cupping glasses over the limbs and body in large numbers, which is stated by Mr. O'Brien, of the *Wrangler*, to have had a good effect in restoring warmth and preventing cramp, but he had only one or two cases of cholera under treatment.

The last, and by no means the least important part of our summary, has reference to the suggestions offered with regard to *prophylaxis*, and they admit of division into those which respect the ship, and those which respect the men. As to the former, the chief recommendations are cleanliness, ventilation, fumigation, whitewashing, dryness, the free use of chloride of zinc, and, as the most important of all, a shifting of locality. For the sake of effecting a speedy drying of the ship, the use of hot water for washing decks is recommended by one gentleman, and swinging stoves by another. In one instance it is suggested that in steam ships the bilges should be lined with metal, to prevent the absorption of grease, and that they should be flushed with a hot alkaline solution previously to purification by chloride of zinc. In one instance, also, the closure of the scuttles and ports at night, is suggested.

The preventive measures recommended, as applicable to the men, are as follows:—A generous diet with fresh provisions when procurable; recreation; amusement; comfort; warm clothing; the use of flannel in general, and especially a belt round the abdomen; the use of quinine wine; a strict surveillance and immediate attention to diarrhœa, however slight; the serving out of tea or coffee before going on deck in the morning; a sufficient supply of clean bedding, well aired; the prevention of intercourse with any ship or locality where cholera exists; abstinence from unripe fruits; from excesses of all kinds; from exposure to night air, wet, and a hot sun; or to the early morning air without food; the

avoidance of fatigue, especially in the sun, and of exposure to sudden chills, or long fasting.

Such, gentlemen, is the substance and such the summary of a report for which, when we consider the arduous duties which devolved upon the medical officers of our fleets, this society and the public at large ought to consider themselves greatly indebted. Some of the suggestions it contains are very valuable, and it offers much food for reflection on a disease, the nature of which still remains so obscure. It has necessarily extended to so great a length that I will only crave your indulgence just to make one or two observations, which I think important.

The most striking fact it contains is, in my opinion, the great disproportion between the liability to cholera of the officers and that of the men under their command. Out of 884 officers in the Black Sea, on board the ships mentioned in this report, there were but five who took the disease, and of these one was a gunner and one a boatswain, whose habits, probably, assimilated more to that of foremast men than of officers of the quarter-deck. This gives a proportion of 1 to 177: while in the case of the men who, exclusive of officers, amounted to 11,488, there were 705 attacks, or 1 in about 16·29.

In the Baltic, where there were in the seven ships, from which we have reports, 183 officers, there was not a single case of cholera among them; while among the men, who, exclusive of officers, amounted to 1841, there were 49 attacks, or 1 in 37·57.

Now, if we assume the exciting cause to have been, in both classes, the same, or nearly the same (and whether we look to atmospheric influence or an emanation from the bodies of men, we can scarcely refuse to admit this, since all were living almost promiscuously in the same vessel), we are forced to attribute the difference chiefly to the predisposing and, in a great measure, preventable causes, and thence to coincide with those who recommend as prophylactics, cleanliness, ventilation, good clothing, and diet (fresh provisions), temperance, moderation in exertion and amusement. Whether the spirit drinking of the men may predispose to the disease more than the wine drinking of the officers, is a question worthy of further investigation. There ought to be some discoverable cause for so vast a difference.

With regard to the proportion of deaths to attacks, the officers are in excess, for four out of the five cases died—but

scarcely any reliable conclusion can be drawn from numbers so small. Among the men in the Black Sea the proportion of deaths to attacks is 1 to 1·8, and in the Baltic 1 to 2·88; but we must bear in mind that the report from the latter is very imperfect, comprising only seven ships altogether, four of which had no cholera. Comparing the sailors, whose duties differ considerably from those of the marines, with this latter body, we find that the proportion of the latter to the former is, in the Black Sea, 2,353 to 8,945, or 1 to 3·8.

The number of marines attacked in the Black Sea was 193, which, their numbers being 2,353, gives a proportion of 1 to 12·19; whereas the sailors, as stated above, were attacked in the proportion of only 1 to 16·29.

The proportion of deaths to attacks among the marines in the Black Sea was as 1 to 1·6. The disease was, therefore, a little more fatal, and notably more frequent among them, than among the sailors. In the Baltic the number of the marines was 384, and that of the sailors 1,448, or 1 marine to 3·77 sailors. The number of attacks among the marines was nine, or 1 in 42·6; and there was only one death.

It would have been very desirable to have been able to institute a similar comparison between the engineers and stokers, and the men otherwise employed: but unfortunately in by far the majority of the reports, they have not been separated from the other sailors.

I have already given the facts respecting premonitory symptoms, which are much at variance with the notions of some, but are yet so distinctly stated, especially by the medical officer of the *Britannia*, who, from his manner of answering, seems evidently to have been fully aware of the import of the question, that we can scarcely doubt their correctness, if not in all, at least in many of the cases.

Of the suggestions as to preventive measures, I consider by far the most valuable that which recommends a shifting of locality. It seems to have proved successful in several instances, and those who consider the exciting cause of cholera to exist in the atmosphere, will regard this as a circumstance strongly favouring their belief.

Gentlemen, I beg, in conclusion, to apologise for having occupied so much of your time; but I felt that unless such materials as have been courteously furnished at our request, were treated in full detail, justice could not be done either to them, or to those meritorious officers from whom they have been obtained.

QUARTERLY REPORT OF THE PROCEEDINGS.

Monday, Nov. 11, 1856. The session for 1856-7 was opened, at the rooms, No. 37, Soho Square, by B. G. Babington, M.D., F.R.S., President of the Society. He congratulated the members on the adjustment of the eastern question, and the consequent restoration of peace to Europe. The President observed, that the whole of our army, and the greater part of the fleet, had either returned home, or had been dispersed over our various colonial stations; and that the naval and military Medical officers, the Sanitary Commissioners, and the medical men employed at the civil hospitals in the east, during the war, had now time to collect the results of their experience in a field of observation, only too extensive, both as regards the course of epidemic diseases, and the casualties incident to active, warlike operations.

"On the Mode of Investigating some Epidemic Diseases. By Gavin Milroy, M.D." In this paper the author made allusion to several important facts that had come under his observation, while serving as Sanitary Commissioner in the Crimea.

A discussion followed, in which Dr. Snow, Dr. Camps, Dr. Greenhow, Dr. Babington, and Dr. McWilliam took part.

Monday, Dec. 3, 1856. "A Sketch of the Principal Features of the Climate of the Crimea, and its effects upon Health, as observed during the first year of the occupation by the Allied Forces. By William Smart, M.D., H.M.S. *Diamond*, late Surgeon in charge of the Naval Brigade Hospital at Balaklava." Read by Dr. McWilliam.

Dr. Milroy, Mr. Rawlinson, Dr. Snow, Dr. Greenhow, and Dr. McWilliam discussed the paper; and Dr. Milroy and Mr. Rawlinson both highly eulogised Dr. Smart's conduct, which had come under their observation while in the Crimea, as being that of a most able and zealous medical officer.